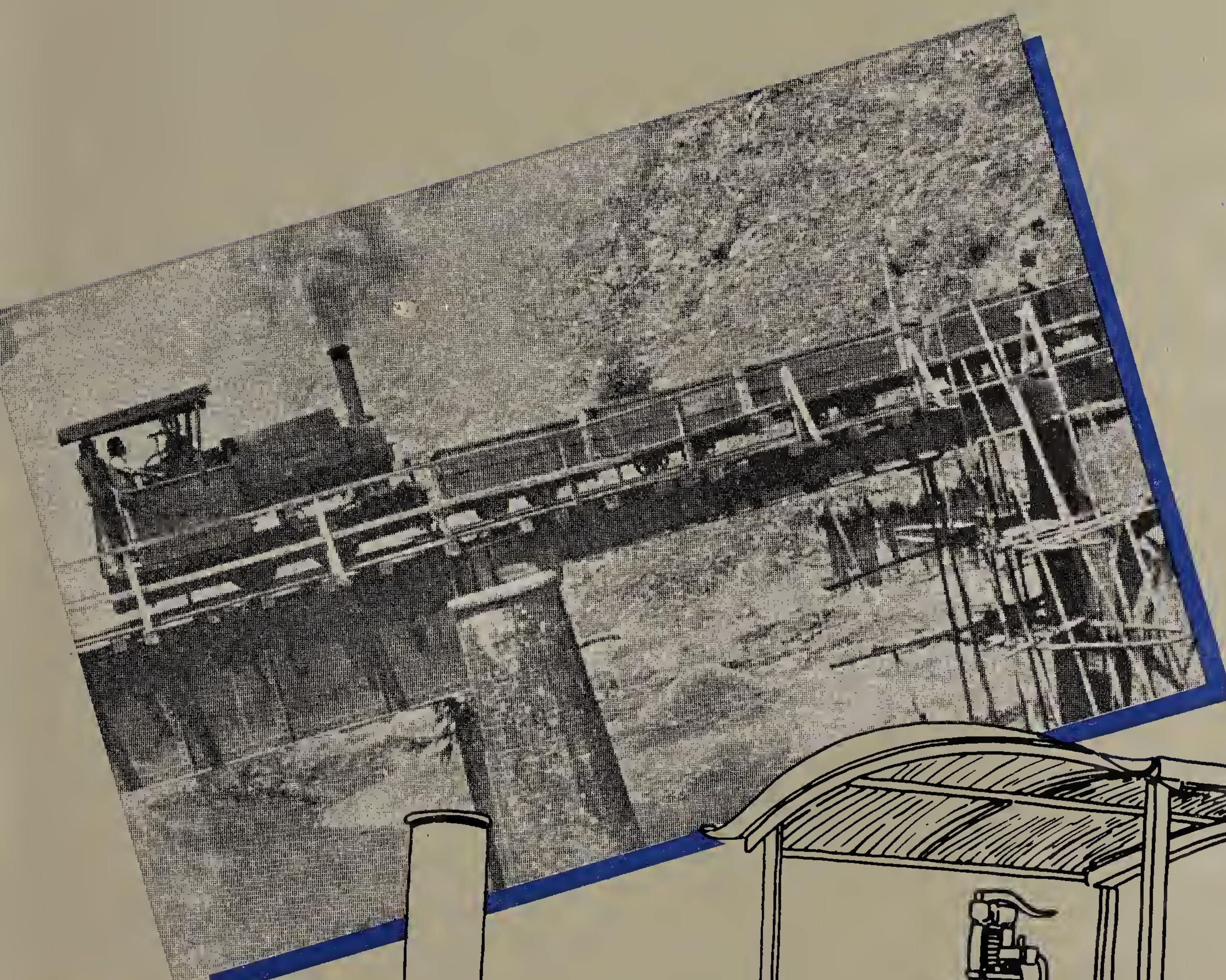
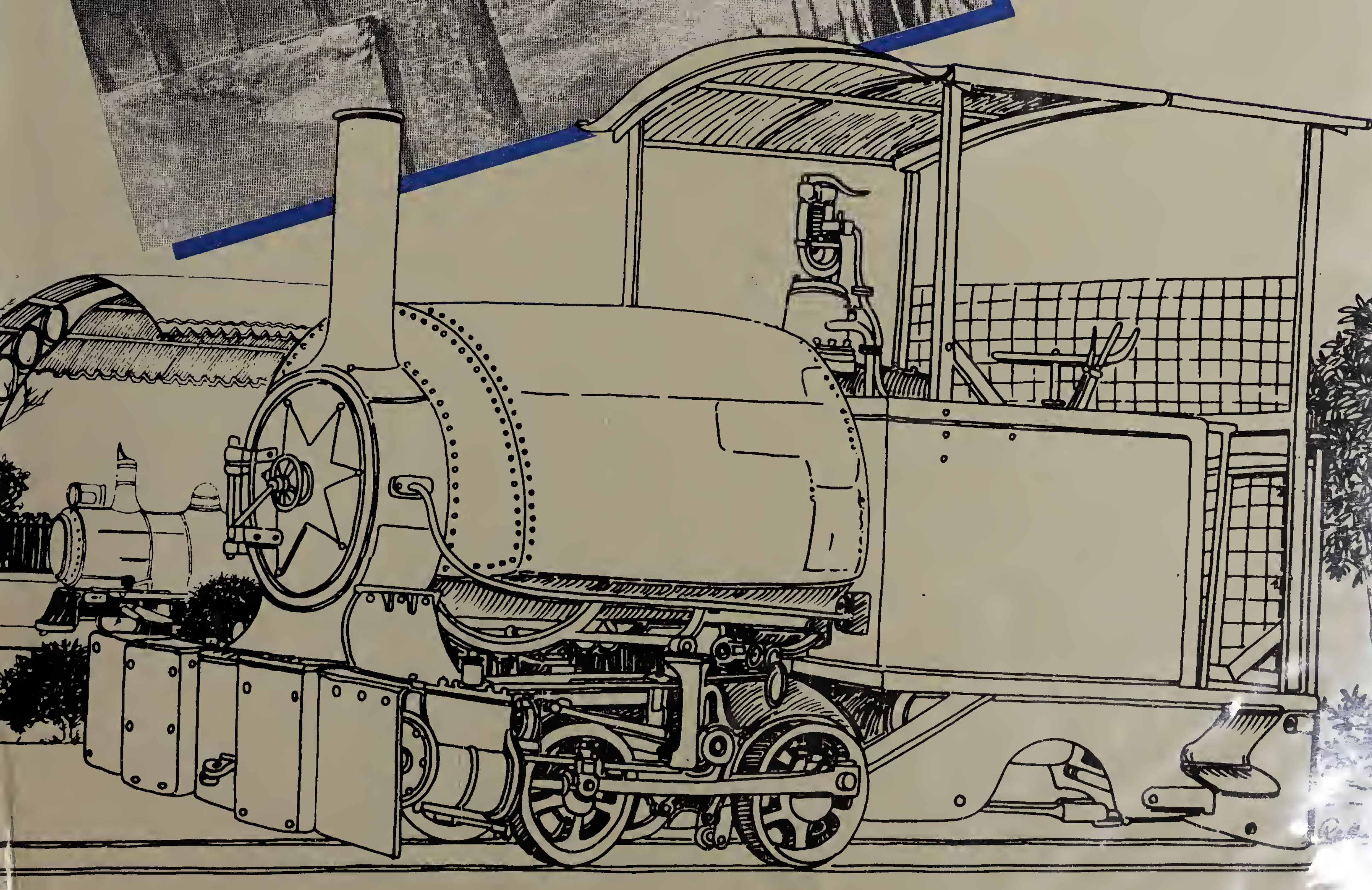
A HISTORY OF INDIAN RAILWAYS

G.S. KHOSLA





This book fulfils the need for an authentic, readable volume which should narrate in some detail the saga of the inception, building, development, organisation, management and operation of the Indian Railways. The rail network in India has played an important part in the defence of her borders against external aggression, the country's economic progress, the development of her agriculture and industry, the evolution of her social structure and the integeration of her people.

Apart from an historical account, the present volume describes the evolution of the managerial structure and the financial administration of the Indian Railways.

Earlier attempts in this field have many gaps which this book tries to cover. It is a standard, chronological history of the system, which will be valuable to the general reader, the research scholar and railwaymen, particularly the new entrants, who will be able to form a fair idea of the significance and the dimensions of the network.

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G. S. Khosla

सत्यमेव जयते

MINISTRY OF RAILWAYS (RAILWAY BOARD)
GOVERNMENT OF INDIA
NEW DELHI
1988

By the same author

Railway Management in India—Thacker & Co. Ltd., Bombay : 1972

Transport—Ministry of Information and Broadcasting : 1972

The book is based on the factual information pertaining to the history and growth of the Indian Railways collected by the author. The views expressed in this book do not necessarily represent the official views of the Ministry of Railways.

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Foreword

One Hundred Thirty-four years ago, one April afternoon history was made at Bori Bunder in Bombay, when to the booming sound of a 21 gun salute, the first train on Indian soil started its maiden journey of 21 miles to Thane. The steam engine and metal track had become a reality in India. Since then, the ubiquitous rail track has travelled the length and breadth of the subcontinent, linking far away places and weaving an iron link among the diverse peoples of India. Today the Railways have a spread of 62,000 route kms., the biggest in Asia and the second biggest, under single management, in the entire world. The growth and evolution of Indian Railways is an exciting story of nation building by Indian people and their journey to political freedom, and economic development. In fact, the history of our Railways is truly the history of our national development. Whether it is the route in the quadrangle connecting India's major metropolis, Bombay, Delhi, Calcutta and Madras, or whether it is the industrial artery linking the temples of modern India at Bhilai, Durgapur, Rourkela, Vizag, Tatanagar, the Indian Railways are the life-line of the nation and the wheels of our economy. Therefore, the performance of this national transport network easily acts as the barometer of the health of the nation and the economy.

It is in this background of the gigantic size of the Indian Railways operation today and its importance for the national economy, that any book on the history of the Railways becomes very important. Apart from indicating the milestones of its progress from Bori Bunder to the Metro Railway at Calcutta, from a colonial instrument to being a major artery of national life to-day, the history of our Railways will also depict the romantic story of our national striving for economic self-sufficiency, and the birth and growth of modern India. This book would have achieved its purpose, if it can make the readers appreciate that our Railways are a major national asset and requires a real major national effort to keep ticking in the best interest of our people.

In my childhood days I was fortunate to witness some of the glory and grandeur of the Railways at our doorsteps. Heading the Railway

family today, when I look back to those days and compare them with the present scenario, I find that the national railway network today with the huge family of 1.7 million railwaymen, and the great responsibilities of literally keeping a nation on the move, is a great spectacle of epic dimensions. It unfolds a grand scheme of covering a distance of 1.5 million kilometres every day, carrying 10 million people and 8.5 lakh tonnes of freight every day.

The record level of productivity achieved by the Railways in 1985-86 and 1986-87 has only heightened this sense of national effort. Today I am happy to note that we have achieved a level of over 306 million tonnes of freight movement, and are on our way to touch the 350 million tonnes mark by the end of the current Plan period.

I am sure Mr. G. S. Khosla's book on the history of Indian Railways will serve as a historic document for years to come.

Madhavrao Scindia

(MADHAVRAO SCINDIA)
Minister of State for Railways, India

New Delhi,
October 30, 1987

Chairman's Preface

Indian Railways today are one of the largest Railway networks in the world, moving about 8.5 lakh tonnes of freight and carrying nearly 1 crore passengers daily. The wagon utilisation figures in recent times have been even better than in advanced countries like Japan and is today the best in the world. Track utilisation has improved from 4.3 Gross Million Tonnes per track kilometre to 11 GMTs on Broad Gauge and from 1.2 GMTs to 2.9 GMTs on Metre Gauge from 1950-51 to 1985-86. Truly, the Indian Railways have emerged as the sinews of the Indian economy and have reached out to bring together the great Indian family.

There has been a quantum jump in both freight and passenger traffic from the year 1950-51. The freight traffic has increased from 44 billion tonne kilometres to nearly 206 billion tonne kilometres in 1985-86 while the passenger traffic increased from 66 billion passenger kilometres to 241 billion passenger kilometres during the same period. This was possible due to the induction of diesel and electric traction, new modern designs of coaches and bogie center buffer coupler wagons and heavier and welded rails, use of prestressed concrete sleepers and improved signalling and telecommunication facilities.

The performance of the Indian Railways during the last two years has been spectacular. In 1985-86, the Railways set up outstanding records of growth and productivity which were outstripped in 1986-87 and now with nine months of the current financial year being over, the Railways are poised to record a hat-trick and are confident of not only meeting the targets but also exceeding it.

Unfortunately, in spite of the pivotal role of the Railways in moving men and materials across this vast country, a comprehensive history of the Indian Railways was last published in 1953, the centenary year, by Shri J. N. Sahani. There has been practically no effort made in the last thirty odd years to chronicle the emergence of the Indian Railways from a 10-coach express trains/4-wheeler goods trains, hauled by steam engines requiring coaling, watering and maintenance at very short intervals, to 22-coach

express trains and bogie freight wagons, moving thousands of kilometres without any maintenance or change of motive power. We have embarked on induction of the latest state of the art technology in locomotives, coaches, wagons, rails, signalling and telecommunication facilities, so that we can move nearly double the freight traffic at the turn of the century. The metre gauge system, both for passenger and freight traffic, will be upgraded and a data bank is being developed for futuristic technology.

Therefore, Shri G. S. Khosla's book on the history of the Indian Railways is welcome and will serve as a reference book on the Indian Railways in the future.

New Delhi,
January 15, 1988.

(RAJ KUMAR JAIN)
Chairman, Railway Board

Introduction

India, a land of diverse cultures, is one nation by virtue of her railways. Ever since the first tracks were laid in the middle of the nineteenth century, the railways, far more than any other form of transport, have been used by the people of this sub-continent as a means of communication between the North and the South, between the East and the West, across its hills and plains, and over mighty rivers that were bridged for the first time by the iron roadway. Railway construction has had far-reaching effect on Indian society. As the system expanded, the incidence for famine, which had caused widespread starvation and thousands of deaths for lack of ready means of transferring sizable quantities of foodgrains from surplus to deficit areas, decreased with remarkable speed.

Trade and commerce was revolutionised by the opening of new markets in distant lands, for example, cotton produced in India was hauled by rail to Bombay, from where it was shipped to the mills of Manchester and Glasgow. But later, cotton mills opened in Nagpur, Bombay, Sholapur and Ahmedabad and these were fed by the railways from the indigenous crop-grown in the black soil regions, as well as imported 'counts' which came *via* the port of Bombay. Again, the railways helped in establishing the export of jute to Dundee, and later in transporting the raw fibre to Indian mills in Calcutta, until India came to enjoy a virtual monopoly of jute production and manufacture at the turn of the 20th century. The establishment of cotton, jute and other industries in India was made possible by the cheap transport of coal provided by her railways. The railways have transformed what was a purely agricultural economy to a mixed economy, in which industry has come to occupy a growing share.

The railways are the sinews of India's vast and varied factories. They haul the products of the soil, such as cotton, jute and tobacco ; products of animals, such as hides, skins and bones; mineral oils; and products of mines, such as coal, iron, manganese ores, limestone, bauxite, gypsum,

mica and zinc to mills which turn these into industrial goods. They carry salt from the sea to plants which manufacture a variety of chemicals that feed and support industry. Steel and cement, that provide muscle to all construction activity, are but end products of a transport cycle whose king-pin is the railways. But for her railways, India would not have been able to find a place in world economy.

The part of the Indian Railways in maintaining the security of India is crucial. Whether it was the Hyderabad operation soon after the country attained independence, the Goa action some years later, the border skirmish with China in 1962 or the engagements with Pakistan in 1965 and again in 1971, the railways rushed troops, arms, ammunitions and stores at top speed to the theatres of war and gave the country's armed forces the necessary logistic support. The railway headquarters and control offices swing into action at the word 'go' and railway wires hum day and night charting the progress of white hot priority trains, originating all over the country and converging on railheads behind the battle front. The territorial army units of the railways have been in the thick of the battle and stood shoulder to shoulder with the regular troops to face enemy fire.

Equally vital is the part played by the railways in the preservation of law and order within the country. The regular running of trains is by itself an assurance to the common man that order prevails in the country. It has great psychological value in maintaining discipline and orderly behaviour among the masses. When trouble brews in any part of the country, the railways rush the personnel of the Central Reserve Police, the Border Security Force and other auxiliary formations to the danger spots to reinforce the machinery of law and order.

Apples and peaches from Himachal Pradesh and Kashmir, oranges from Nagpur, mangoes from Varanasi and Ratnagiri, coconut from Kerala—these and many other kinds of fruits add to the joy of living, bringing them within the reach of the poor, who but for the cheap transport provided by the Indian Railways, would not have been able to savour these delicious gifts of the rich Indian soil.

The Railways have enabled the people of India to travel long distances on pilgrimage, to attend fairs and religious congregations, to visit friends and relations, and of late to move about for pleasure, as tourists. The Railways thus, fulfil some of the fundamental needs of the citizens of this country and add to the richness and quality of life.

The role of the Indian Railways in bringing about the integration of the people living in different regions with diverse physical features and

under vastly different climates is indeed unique. From the Himalayas in the North to the sea-shores washed by the Indian ocean in the South, there is a bewildering variety of terrain, from the snowy blizzards of Kashmir to the warm sunshine of Kanyakumari, there is a whole range of climate ; between the wheatlands of the Indo-Gangetic plains and the rice bowl of the South, the land and air are a world apart. The railways annihilate distance; they cut across geographical barriers such as rivers and mountains ; and they enable people to intermix.

Train loads of wheat from the surplus North to the areas of scarcity in other parts of the country have changed people's food habits. The daily interchange of hundreds and thousands of people between different cities has popularised certain fashions in clothes so that the majority of urbanites are dressed the same all over the country. The growing commonality of food habits, dress and outlook brought about by the railways is helping to blend the diverse elements of the population of this country into one people, one nation.

While underlining the great service that the railways have done and are doing to India, no objective appraisal of the part played by them, can omit to mention certain murky aspects. The decline of the Indian handicrafts, though originally engineered by the British rulers, beginning with the Bengal weavers of the Dacca muslin, was to a great extent aggravated by the railways. Again the railways, by providing ready means of transport from the hinterland to the ports, made India a grower of raw materials and importer of manufactured products, which retarded the growth of her own industries. While integrating the people of this sub-continent with different ethnic characteristics, speaking different languages and professing different faiths, the railways have, from time to time through their long history, also accentuated certain divisions, such as the division between the followers of different religions, between the sexes, and between the classes. At one time, there were separate Hindu and Muslim water huts, food stalls and refreshment rooms all along the line. While provision of reserved compartments for Anglo-Indians was a symptom of the 200 year old British domination, separation of passengers into the first, second, intermediate and third class, did emphasise social and economic disparities. While some of these dark shadows on longer fall across the railway tracks, as many changes have been brought about since India became politically free in 1947, history cannot possibly ignore these.

It is but proper that the beginning, the expansion and the growth of India's great railway system be traced to its historical origins; that some-

thing of the romance and excitement of the earlier pioneering years be recapitulated; that different phases of railway construction and development during the last one hundred and thirty years be outlined; that the story of the lustre and luxury of India's great trains, such as the Imperial Indian Mail between Ballard Pier and Calcutta and the Frontier Mail between Peshawar and Bombay giving place to the Jayanti Jantas, the symbol of the welfare of the common man, be told; that the evolution of the organisation and structuring of the management of Indian Railways be described; and that the part played by the railways in the social, economic and political development of India be permanently placed on record.

My History is not just bones, consisting of skeletal facts, such as the dates of the construction of different lines and the mileage added from time to time. I have not ignored the flesh and blood which make a railway system tick so that this narrative is the saga of an organism pulsating with life, giving a sense of purpose to those who helped to create it and a meaning to those for whose benefit it was created. Social, economic and political changes brought about by the railways have been recorded and the part played by them in changing the life style of the Indian people duly noted.

I have devoted more space to the first few years than what was strictly warranted by the time span, as it was during this period that the early builders conceived, planned and laid the first trunk lines. They came up against many problems, the nature of the terrain, selection of the most suitable gauge, choosing one out of several competing alignments in the light of scanty geophysical data, the most economical method of bridging India's great rivers with enormously wide beds in the monsoons and a trickle in the dry season and what may today appear somewhat unbelievable, the hostile climate which sapped the energies of the pioneers.

The obstacles they had to overcome, relating to finance, equipment and technical personnel were many. All this wherewithal had to be imported from a distant land. An organisation had to be built up from scratch. Considering all these factors, the progress made was remarkable, though it must be conceded that there were powerful motives of defence and imperial conquest that fired the zeal of the British rulers who made the decision to build railways in India and ethused the rank and file who applied themselves to the tasks on the ground. As a result of their combined and sustained efforts, 4,000 miles (6,440 km) of railways had been built by 1868, that is, during the first fifteen years. Another 2,000 miles (3,220) kilometres) was under survey or under construction.

After the initial period of difficulty, construction proceeded at a steady pace, except for some occasional set-backs caused by financial constraints. My narrative moves across this plateau of time which covers nearly half a century at a fairly fast pace. The policy for railway expansion had been settled, the techniques evolved to a high degree of perfection, and the organisational structure firmly established. This period begins with the seventies of the nineteenth century and brings the narrative forward to the mid-twenties of the present century.

Then we come to a period of rethinking and reorientation of the railway philosophy in India. The appointment of the Acworth Committee which submitted a comprehensive report in 1924 was a watershed in the history of the Indian Railways. The commercial and the financial aspects, which had hitherto suffered neglect, came to the fore and their value recognised. There were some structural changes in the organisation and a shift in perspective as to the objectives of the undertaking and the importance of its financial viability.

I bring my narrative forward to the period of planned development after 1947, the year during which India became independent of British authority. As these years were full of promise, which must follow after freedom from foreign yoke, many quick changes took place, the merging of big and small lines belonging to the princely states into an integrated system, the zoning and re-zoning of the system, modernisation of traction, signalling and track maintenance techniques, liberalisation of the emoluments and terms of employment of the work-force and strengthening of the organisational set-up. This period of multi-faced development, which reflects political, managerial and technical changes of great significance deserves to be viewed in some detail.

In this History, I have naturally given pride of place to the railways which belong to India as we know the country today, that is, after the partition that took place in 1947. I have traced the origin and development of such railways in detail. But as these were an integral part of a bigger system, large portions of which went to West Pakistan and East Pakistan, known since 1971 as Pakistan, and Bangladesh, the railways of these two countries necessarily figure in my narrative.

I have touched on the railways of Pakistan and Bangladesh in the context of their common historical background that they share with the railways of India, but the railways of these two neighbouring countries do not receive detailed treatment. And in any case after 1947, they ceased to be relevant so far as this book is concerned.

The Burma Railways were also a part of the Indian railway system till 1937 when Burma was administratively separated from India. This 2050 miles (3316.6 kilometres) of metre gauge railway upto that year had been built to Indian standards and specifications. Though this mileage formed a portion of the Indian Railways system, yet being physically isolated from the rest, it can claim no more than a passing mention in this book.

The names of many stations have changed from the original and this process has been accelerated in recent years. Current names have been used, but for the sake of historical accuracy, the original names have been shown in parentheses. Similarly, distances have been shown in miles, yards and feet, with the metric equivalents, where significant, in parentheses.

To facilitate reference, annexures related to a particular chapter have been placed immediately after it, instead of at the end of the book. They have been numbered chapter-wise, e. g. the first annexure of chapter one has been numbered 1-A, second annexure as 1-B and so on.

G. S. Khosla

Acknowledgements

In response to my proposal made in 1978 that a standard history of Indian Railways, which could be valuable to the general reader, the research scholar and railwaymen, particularly the new entrants, to give them an idea of the significance and dimensions of the system they are going to serve, be written, the Railway Board in 1979 accepted the project. I am grateful to them for giving me this opportunity to produce the present work.

I acknowledge the co-operation I received from the General Managers of the Central, Eastern, Northeast Frontier, Northern, South Eastern, Southern and Western Railways and of the Metro Transport Project, Calcutta and the Integral Coach Factory. Perambur, their Heads of Departments and the Chief Public Relation Officers, who helped me in collecting the data for my book.

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At the National Library Calcutta and the Nehru Museum and Library, New Delhi, I was able to obtain useful material with the help of the staff of these institutions.

It will be difficult to enumerate all those who had helped me in my task, but among them I must specially mention Dr. A. K. Arora of the Western Railway, S. Jaswant Singh Virdi of Kapurthala and my wife Manorama who assisted me throughout the proect.

G. S. Khosla

Contents

1

The Inception of Railways in India

The railway age dawned in India on 16 April 1853, when the first train ran from Bombay to Thana, a distance of 21 miles (33.81 km). For some years before that, however, the idea of building railways in India had taken concrete shape with the Court of Directors of the East India Company in London. The latter had obtained a foothold in India as a trading company, but gradually lost most of its privileges it had enjoyed as an instrument of commerce. It had, however, been made responsible for the governance of India, under the supervision of a Court of Directors in London. The final authority lay, of course, with the British Cabinet, who acted on the advice of its special Board of Control for Indian Affairs, headed by a Cabinet Minister. There was a Governor-General at Fort William in Bengal who had superintending authority over the administration in India.

The First Proposals

The first proposals for the construction of railways in India were presented in 1844 to the East India Company by a London Company headed by R. M. Stephenson, who later became Agent and Managing Director of the East Indian Railway, which was one of the first two railway companies that found a foothold in India. The other was the Great Indian Peninsula Railway Company. They were incorporated in England for the purpose of constructing railway lines in Calcutta and Bombay presidencies respectively.

From political, military and commercial considerations, Lord Hardinge, who was Governor General of India from 1844 to 1848 thought that the Court of Directors of the East India Company should liberally give assistance to private capitalists, willing to make railways in India, without waiting for proof that the construction of railways will yield reasonable profit. The Governor-General stated that in his opinion, "on military considerations alone, the grant of one million sterling, or an annual contribution of five lakhs of rupees, may be contributed to the great line when completed from Calcutta to Delhi, and a pecuniary saving be effected by a diminution of military establishments."

There is an interesting despatch addressed by the Court of Directors to the Governor-General of India on 7 May 1845, in which the policy in regard to the construction of railways in India was laid down in some detail. The Directors suggested that the first attempt should be made on a limited scale as they envisaged certain difficulties peculiar to the climate and circumstances of India. These difficulties were enumerated as below :

1st Periodical rains and inundations ;

2nd The continued action of violent winds, and influence of a vertical sun ;

3rd The ravages of insects and vermin upon timber and earthwork ;

4th The destructive effects of the spontaneous vegetation of underwood upon earth and brick-work ;

5th The unenclosed and unprotected tracts of the country through which railroads would pass ; and

6th The difficulty and expenses of securing the services of competent and trustworthy engineers.

Living in a cold country, where bright sunshine is rare, the Directors of the Court of the East India Company, which then ruled India, were understandably afraid of the effects of a "vertical sun", though not appreciative of its value as a corrective against "insects and vermin." Equally imaginary was their fear that they would not be able to secure the "services of competent and trustworthy engineers."

Policy for Railways in India

In the matter of broad principles of policy to be adopted for the construction of railways, the Court of Directors, however, displayed much wisdom and farsightedness and most of the principles laid down by it have been followed during the last 130 years of the history of Indian Railways. The despatch of 7 May 1845, stated :

1st The intended line of communication, in the first instance, and at a subsequent period, the detailed plans and estimates, be submitted for examination to the Government ;

2nd The constitution and terms of agreement of the proposed Company be in like manner submitted to the Government ;

3rd The books and accounts of the company be at all times open to the inspection of officers to be appointed by the Government ;

4th The rate of the profit shall not exceed a proportion to be fixed and that the Government shall have power to reduce the rates of conveyance, so that they may not exceed that proportion ;

5th If satisfied on these points, the Indian Legislature shall grant a charter of incorporation, and that the Court of Directors shall concur in applying for the grant of a similar charter in England ; and

6th The Government shall, by all proper means, facilitate the surveys, and other operations of the Company, as well as the necessary purchase of land, and generally promote the success of the Undertaking.

With regard to the financial viability of the proposed railways in India, this communication from the Court of Directors to the Governor-General of India observed : "According to the experience of this country (Great Britain) by far the largest returns are procured from passengers; the least from the traffic of goods. The condition of India is in this respect directly the reverse of that of England. Instead of a dense and wealthy population, the people of India are poor, and in many parts thinly scattered over extensive tracts of the country. But, on the other hand, India abounds in valuable products of nature which are in a great measure deprived of a profitable market by want of cheap and expeditious means of transport. It may, therefore, be assured that remuneration for rail-roads in India, must for the present, be drawn chiefly from the conveyance of merchandise, and not from passengers." The anticipation of the Court of Directors, watching the Indian scene for a distance of 5,000 miles proved ominous, and today, 130 years later, the mainstay of the revenues of the Indian Railways is freight and not passenger traffic.

This despatch was the first official recognition on the part of the British Government of the desirability of railways in India. It was ordered by the House of Commons to be printed on 28 May 1845[1]. The Court selected Mr. Simms as Consulting Engineer and he reached India in September 1845.

Soon after his arrival he suggested that Government should grant leases to joint stock companies to construct and operate certain lines for a given number of years, give land free for the construction of railways and impose no tax or duty on railways' earnings.

The Basic Principles

On their part, Mr Simms suggested, the companies will obtain the Consulting Engineer's approval to detailed plans for construction of railways; hand over the railways to Government on expiration of the lease ; will open the railway from Calcutta to Delhi in 7 years from the date of the grant of concession; will obtain the approval of the Government to all commercial and operational details, such as tariffs of fares and freight and time tables; carry government mail, military troops and stores at reduced tolls; deposit 10 to 15 per cent of the estimated capital "as a guarantee of sincerity" with Government; adhere to uniform standards with regard to signals, rolling stock, etc. ; maintain accounts of receipts and expenditure, number of passengers and quantities of merchandise in approved forms and submit these periodically to Government; comply with specifications relating to construction and dimensions, and accept cancellation of the contracts in the event of their failure to run "one train per day from end to end." The document containing these suggestions is dated 6 February 1846.

The subject was later remitted to a Committee of Engineers consisting of Mr Simms and Captain Boileau and Captain Western of Bengal Engineers. While this committee generally agreed that the building of railways was desirable in India, they enumerated some of the difficulties which had already been noted in the despatch dated 7 May 1845 from the Court of Directors to the Governor-General of India-in-Council. The Report of the Commitee of Engineers stated : "Railroads are not inapplicable to the peculiarities and circumstances of India, but on the contrary, are not only a great desideratum, but with proper attention can be constructed and maintained, as perfectly as in any part of Europe."[2] The Railways were thus built in India in the middle of the nineteenth century at the initiative of the Government of the day, and not in response to public demand. True, a couple of meetings were held in Bombay to express the citizens' demand that a railway should be built from Bombay to Bhore Ghat, but their significance was confined to the expression of local sentiment which did not want to lag behind England from where emanated all inspiration for material progress.

Accepting the joint recommendations of the Committee of Engineers and the Government of India, the Court of Directors resolved that it was desirable, that the first railway in India ought to be a trunk line, and that it was of great and primary importance to connect the seat of the Supreme Government with the North-Western Provinces.[3] If the more exact surveys of the country which had to be made proved that no serious difficulties were likely to arise from the physical character of the country, the

Court also decided that the first railway in India should be from Calcutta to Delhi, through Mirzapore.

It was also decided that railways in India should be constructed through the agency of joint stock companies; only the conditions of the agreement to be entered into with such companies remained to be discussed and settled. But it was found very difficult to reconcile the conflicting views of the joint stock companies, of the Board of Control for India, of the Court of Directors, and of the Government of India; and a great deal of time was spent in lengthy correspondence and discussion.

Controversy over Guarantee

The Court proposed to grant, on a lease for ninety-nine years, the land required by railway companies, but stipulated that the Government should have the option of purchasing the railways at the market value of the shares during the three last years. As to the question of guarantee, the Court was of the opinion, notwithstanding the categorical views of the Government of India, that the grant of land merely would not be sufficient to attract the requisite capital and that no company would be willing to build railways in India without a guarantee of some dividend.

The Court proposed to guarantee 4 per cent on all sums paid into their treasury during the next three years, to the extent of 5 million sterling on 333 miles of railway at 15,000 sterling per mile, requiring, however, that the Court should be the sole judge regarding the expediency of affording the guarantee to further sums required for the extension of the line; that all profits should be divisible between the Court and the railway company; and that a deposit of one million sterling shall be paid into the treasury of the Court before the commencement of the guarantee.

The Board of Control accepted the general principles suggested by the Court, accepting that the early introduction of railways into India was of primary importance, and that for that purpose it would be desirable to employ the agency of joint stock companies; but they objected to some of the details proposed by the Court. Instead of five million sterling they limited the extent of the capital to three million, a sum they deemed ample to construct 150 miles of railway at 15,000 sterling per mile in two sections, one in the Lower and the other in the Upper Provinces of the Bengal Presidency; they also modified the periods of purchase proposed, stipulating that Government should have the right of purchasing the railway at the end of twenty-five or fifty years.

They objected to the very idea of a guarantee strongly and concurred with the Government of India that land being granted free, it ought to be

unnecessary. The Board would only consent to such a concession on the understanding that the Court had satisfied themselves that sufficient capital could not be raised without a guarantee, that it shall be strictly confined to the first experiment, and that in no circumstances it would be extended to a period longer than fifteen years. A deposit of 500,000 sterling must be made and the approval of the Government of India to all the designs and operations of the railway company was to be insisted upon.

When these terms and conditions were communicated to the promoters of the East Indian Railway they objected, first, to the guarantee of interest applying to the sum of three million sterling only, but argued that it should be applicable to the actual cost of the sections to be chosen; second, that it ought to be extended to the entire capital required to complete all the works needed to finish the entire line, their argument being that it was the expectation of profit from the through traffic which might induce the capitalists to accept a rate of interest so low as 4 per cent; and third, that to curtail the period of the guarantee to a date short of that fixed for the purchase of the railway by Government would be fatal to the attempt to obtain the requisite capital. In addition, they quoted the example of the grant of liberal terms to a railway company floated to construct railways in Ceylon and Trinidad.

At the same time the Chambers of Commerce of Manchester and Glasgow represented the need for the introduction of a railway system in India to convey cotton from the interior to Indian ports for shipment. They urged a grant of land and a guarantee of a minimum rate of interest to the Great Indian Peninsula Railway Company, in the same way as had been done in several instances in respect of joint stock companies constructing railways in various colonies of the British Empire.

In June 1847, the Court of Directors addressed the Board of Control submitting that "India has just reason to expect, that encouragement to the introduction of railways into that country will at least be afforded upon the scale (i. e. 5 per cent), which Her Majesty's Government may have deemed to be necessary in the colonies." The Board reluctantly consented in the light of the then money market, to raise the guaranteed rate of interest from 4 to 5 per cent for a period of fifteen years; but on this being communicated to the East Indian Railway Company, it pleaded for an extension of the time from fifteen to twenty-five years. On the recommendation of the Court, the Board of Control approved this also on 15 July 1847. The Directors of the East Indian Railway Company on 18 August 1847, agreed to go ahead with preparations for the construction of the two proposed sections of a railway from Calcutta to Delhi.

The Three Presidencies

At this stage, a further hurdle delayed progress. The Court of Directors represented that it was desirable to construct a short experimental line, not only in Bengal, but in the other two presidencies also, and with that object proposed to the Board of Control for India to offer to the Madras Railway Company and to the Great Indian Peninsula Railway Company similar facilities as had been granted to the East Indian Railway Company.

The Board of Control were, however, unwilling to accept this proposal until the result of the experiment in Bengal was known and until a professional judgement by engineers deputed by Government had been obtained on the schemes for experimental railways proposed for the presidencies of Bombay and Madras. The Court repeated their views, stating that their sanction to the schemes would, of course, be dependent upon the result of more exact surveys and that the local conditions of each presidency were so different that the Bengal experiment could not be relied upon as a safe guide for railways in Bombay and Madras.

The Board of Control at long last agreed to consider the matter on receiving from the Court of Directors concrete proposals for what they described as 'the Minor Presidencies, namely' the length of lines required. In reply the Court stated that they proposed to give aid similar to that offered to the East Indian Railway Company, to a 70-mile (112.7 km) line from Bombay to Kalyan; and in September 1847, the Board somewhat reluctantly agreed to accede to the construction of the railway proposed for the Bombay Presidency, but refused to consider a line in the Madras Presidency, as no joint-stock company had pledged to construct a line there.

In Bombay too, the negotiations progressed rather slowly. The terms and conditions proposed by the Court of Directors were sent by the railway company to Messrs Robert Stephenson, Clark, and Chapman to report upon; these gentlemen strongly advised the railway company not to accept them. Their pointed comment castigated the Board of Control and the Government of India in no uncertain terms. It appears on reviewing the above terms, and the comments upon them contained in the various communications from the Government of India...that the practical effect of the whole will be that the Government will choose the line, control the details of the construction and mode of working, fix the period for its completion, draw up its regulations, limit its rates of charge and its profits, reserve to itself the power of producing very serious delays, and finally, withdrawing its guarantee and confiscate the works to its own use and profit." The Chairman of the Great Indian Peninsula Railway Company endeavoured

to obtain some modification in the terms offered by the Court, but eventually accepted them on 6 June 1948. Thereafter it was with great difficulty that GIPR and EIR companies were able to make the required deposits of 30,000 and 60,000 sterling respectively.

Now a further difficulty arose. The capital could not be raised and shareholders protested against the undertaking being carried on at all in the mutilated shape that the Board of Control had agreed to. On 29 January 1849, the Court, considering that no advantage would result from a continuation of these negotiations, proposed to the Board of Control to call off the entire deal and return the deposits of the railway companies. The question was re-examined by the Board who sent to the Court an important letter in which the Board endeavoured to alter the terms so as to make them at once safe for the Government and acceptable to the companies.

Terms and Conditions

They suggested that the East India Company should agree to guarantee 5 per cent interest on all sums paid with their permission into their treasury as long as the railway company may remain in possession of the railways; that if there be any loss in working the line, the railway company shall bear it, but shall be at liberty to give it up to the East India Company at any time they chose on giving six month's notice of their intention to do so and shall then obtain repayment of the actual capital expended on the construction of the line, plant, and rolling stock. Practically, this was an absolute guarantee of 5 per cent, with a risk to the shareholder for six months only, as if a line could be proved to be working at a loss, and the East India Company declined to make up the deficiency, the shareholders could avail themselves of the option of repayment of their capital. On 22 March 1849, the Court, though stating that the modifications now proposed were at variance with the views which had earlier been taken by them, yet, anxious to bring the question to an early and satisfactory conclusion, consented to the suggested alterations.

The terms and conditions were further revised and according to these land was to be given free, a guarantee of interest at 5 per cent conceded, Government retaining control to determine the standards of construction and to exercise control and supervision of working, and the contract being for a period of 99 years, Government retaining the option to purchase the line after 25 or 50 years. The East Indian and the Great Indian Peninsula Railway Companies accepted the revised terms and the legal agreements were ultimately signed on 17 August 1849.

This detailed account of the prolonged and tortuous negotiations stretched over a period of five years from 1844 to 1849 relating to the terms

of the contracts between the joint-stock companies interested in building railways in India on the one part and the Board of Control, the Court of Directors of the East India Company and the Government of India, on the other part, should dispel the impression sought to be created in many accounts of the guarantee system that have appeared in Indian publications that five per cent interest was gifted away by the East India Company to the railway companies who built the first lines in India. It will be amply clear from the course of these negotiations that both the Board of Control responsible to British Parliament for Indian affairs and the Governor-General-in-Council in India made their best endeavour to, first resist the idea of a guarantee altogether, and later, to secure a rate lower than five per cent, but their efforts failed against the market forces and the anxiety, fully justified, of the East India Company to get railways started in India as quickly as possible. Though the Board of Control had ultimately to yield on the issue of five per cent guarantee, they succeeded in imposing many stringent conditions on the companies and these ensured that money was not wasted, standards laid down for construction by Government of India's Consulting Engineers were scrupulously observed, the method of working was in conformity with the requirements of safety and efficiency, the rates and fares charged from the public received the prior approval of Government and regular statements of income and expenditure were submitted by the companies to Government in the prescribed proforma.

Lord Dalhousie's Contribution

An account of the inception of railways in India must take note of the crucial part played by Lord Dalhousie, Governor-General of India from 1848 to 1856, in the formulation of a policy for railway construction in this country. He wrote extensively on official files on the political, economic and social benefits that would flow from the introduction of railways into the Indian Empire, the most suitable gauge for such railways, territories of the sub-continent that the first lines should traverse, the agency that should be employed for laying the tracks and operating the lines, the terms under which contracts should be given, the degree of control that should be exercised by Government, the scale of charges that should be permitted and the mechanism for the termination of the contracts and acquisition of the lines by the Government. His treatment of the subject was exhaustive and covered every aspect of the question of railways and every possible contingency that could arise in connection therewith.

Two minutes written by Lord Dalhousie, one in 1850 and the other in 1853, have become famous. As the latter minute covers most of the topics discussed in the earlier minute, with the exception of the question of the

most suitable gauge for India, it would suffice to take note here of the 1853 minute.

This celebrated Minute, dated 20 April 1853, runs into 216 hand-written pages. The Governor-General had a sprawling hand-writing and his minute covers only half the page. The other half of the heavy thick 32 cm× 18 cm sheets having been left blank to facilitate binding and preservation. Obviously Dalhousie, as he plodded his pen at such great length, was conscious of the historic importance of what he was placing on record. Important excerpts from this Minute are reproduced as Annexure 1 B.[4]

He considered the question of railways in India under several different heads :

1. a general system of railways for India on which Major Kennedy, Consulting Engineer to Government of India, had dwelt in his memorandum dated 14 September 1852 transmitted by the Court of Directors of the East India Company,
2. the lines required in the Presidency of Bengal,
3. the lines required in the Presidency of Bombay,
4. the lines required in the Presidency of Madras,
5. the agency by which the lines should be constructed and the general principles which ought to be observed in the construction of these, and
6. the particular companies which seek permission to undertake them.

After recommending that the line from Calcutta to Delhi should receive the highest priority, Lord Dalhousie stated that the line up to Burdwan and Raniganj had been sanctioned some time earlier, Burdwan to Raj Mahal approved, Consulting Engineer's report regarding survey of line from Rajmahal to Allahabad had been found fully satisfactory, and that beyond Allahabad though the country had not been minutely surveyed it was "known in its general character to be eminently favourable for the formation of a railway."

Lord Dalhousie went on to discuss the possible military threat to the Empire from Nepal and Kabul, including "the probability of an European invasion by way of Kabul, or by an European force." He concluded that the line from Calcutta to Delhi would provide a continuous line of Communication from the seat of the Government to the farthest regions under the British Empire. This was the line which received his first attention for certain obvious reasons.

Political and Commercial Benefits

According to the criteria he had laid down in his minute, the line was first calculated to afford vast political and commercial advantages ;

second, except for the bridging of rivers, it presented no engineering problems ; and third, it could be conveniently used as a trunk line for providing connections to certain special areas, such as coalfields, by means of branch lines.

Discussing the construction of railways in Bombay Presidency, Lord Dalhousie was again preoccupied with the military and political advantages of a rail connection between the port of Bombay and the cities of 'Hindustan.' During 1853, a steam boat service along the Indus had been established to Karachi and this had greatly helped the movement of men and materials from sea to the region west of Jamuna. This provided a parallel for a railway link between Bombay and cities like Allahabad and Banaras, as such a link, would facilitate the movement of troops coming from England for duty in India instead of recruits having to first report to Calcutta to join the Bengal Army and from there to proceed to their station of posting. The Governor-General also stated the advantages of a connection between Bombay and the cities of Hindustan for "every invalid that was sent back shattered to his home."

As Lord Dalhousie wrote his historic minute, a railway line from Alexandria to Suez was nearing completion in Egypt, which the Governor-General thought would provide a speedy means of transit for troops and merchandise coming from England to India. He wrote : "The line from Bombay communicating through Egypt with England would be shorter and speedier, by virtue of competition probably as cheap as that through Bengal, while European goods conveyed direct to Bombay by sea would, I apprehend, be able to enter the markets of Hindustan at an advantage as compared with similar goods by way of Calcutta. On these grounds I consider that a line of railway connecting upper India with the Western parts and with the Presidency of Bombay would be of great political and commercial value. I beg leave strongly to advocate its construction".

The Outline

Considering the general question of connecting Madras with the Indian railway system, Lord Dalhousie observed that the presidency of Madras had a considerable army, but hardly any foreign frontier. Yet a railway connecting the Presidency with Bombay would be useful, as the Madras Army would at once be available for imperial purposes, and the military power of the British Government would be enhanced. Such a line would also probably be of commercial value to the Presidency of Madras itself, added the Governor-General, but obviously in Madras, like Bengal and Bombay, the over-riding consideration which weighed with him was Imperial defence. So he suggested two lines, one for the north-western and the other for the south-western traffic.

He advised that a line be constructed from Madras, via Walajah Road (Arcot) Vellore, Salem and onward to the western coast, a branch being taken to Bangalore and another to the foot of the Nilgiris, near Ootacamund. Bangalore was an important military station of the Madras Presidency ; a European regiment was always stationed at Cannanore; and it was proposed to keep another at a sanatorium in the hills. Lord Dalhousie emphasised the political advantages of a line passing through these points, while the probable traffic would be adequate to make this line remunerative.

For the second stream of traffic Lord Dalhousie recommended that a line be constructed from Madras through the Cuddapah District to Bellary ; and then to Bombay, should a survey of the country prove that a suitable alignment could be found. These proposals were tentative as the knowledge of the districts lying between Madras and Bombay was at that stage imperfect.

In regard to the agency by which these railways should be constructed, Lord Dalhousie recommended that the work should be done by joint stock companies, under the control and supervision of the Government.

This minute was sent to England on 4 May 1853 and on 17 August of the same year the Court replied, acknowledging the great political, commercial and social advantages which must ensue from the construction of an extensive and well-devised system of railways in India and fully concurring in the desirability of at once beginning the undertaking in a large and comprehensive manner. They gave their assent to the immediate commencement, in various parts simultaneously, of a line from Calcutta along the Ganges valley to Delhi. For Bombay Presidency they desired that surveys of the ghats and the various proposed routes be made at once. With regard to the railway projected for the Madras Presidency, they would be prepared to sanction a line from Madras to Bombay, via Cuddapah and Bellary, subject to a satisfactory survey.

Accepting the suggestion to entrust the construction of railways in India to private companies, the Court observed that "Government officers should be required to exact the utmost economy consistent with perfect safety and efficiency in the original construction of the line and in all buildings and work of every description connected with it."

Thus the seal was set on the much debated question of the railways in India and the way was cleared for an ambitious programme of construction in the subcontinent.

NOTES AND REFERENCES

1. Annexure 1A.
2. Railways of India by Edward Davidson, London 1868.
3. North Western Provinces in the 1850s meant the territory roughly north and west of the province of Bihar.
4. Annexure 1B.

Annexure 1A

EAST INDIA

RETURN to an Order of the Honourable The House of Commons dated 16 May 1845

Copy "of a DESPATCH addressed by the Court of Directors of the East India Company to the Governor-General of India, calling his attention to the question of Railway Communication in that Country."

East India House, JAMES C. MELVILL
21 May 1845.

Ordered, by the House of Commons, to be Printed, 28 May 1845.

Court of Directors To The Government of India.

OUR GOVERNOR GENERAL OF INDIA IN COUNCIL

Legislative Department, 7 May (No. 11) 1845

Para 1. In consequence of applications from private parties for our cooperation in forming Railroads on an extensive scale in different parts of India, we have been led to take into consideration the general principles by which our proceedings on this most important subject ought to be regulated. Copies of the papers received from those parties are transmitted as numbers in the packet.

From Messrs. White and Berret	8th Nov. 1844;
Mr Stephenson	2nd Dec. 1844;
Ditto	13th December 1844 (with enclosure)
Sir G. Larpent and Mr Stephenson	30th December 1844;
Ditto ditto	28th January 1845;
Chairman of East India and China Association, with Resolution	25th February 1845.
Printed Papers : prospectus of Great Indian Railway Company, with Supplement Report etc, on Railways by Mr Stephenson.	

2. The advantage of Railroads is available only where proportionately large returns can be obtained to meet the great expense, first of constructing, and then of working them. According to the experience of this country (Great Britain), by far the largest returns are procured from passengers, the least from the traffic of goods. The condition of India is in this respect directly the reverse of that of England. Instead of a dense and wealthy population, the people of India are poor, and in many parts thinly scattered over extensive tracts of country. But, on the other hand, India abounds in valuable products of nature, which are in a great measure deprived of a profitable market by want of cheap and expeditious means of transport. It may therefore be assumed that remuneration for Railroads in India must, for the present, be drawn chiefly from the conveyance of merchandise, and not from passengers. It cannot admit of question, that wherever railroad communication can be advantageously introduced and maintained, it is eminently deserving of encouragement and co-operation from the Government.

3. Independently of the difficulties common to Railroads in all countries, there are others peculiar to the climate and circumstances of India, which may render it advisable that the first attempt should be made on a limited scale. These peculiar difficulties may be classed under the following heads, viz.

1st. Periodical rains and inundations.

2d. The continued action of violent winds, influence of a vertical sun.

3d. The ravages of insects and vermin upon timber and earth work.

4th. The destructive effects of the spontaneous vegetation of underwood upon earth and brick-work.

5th. The unenclosed and unprotected tracts of country through which railroads would pass.

6th. The difficulty and expense of securing the services of competent and trustworthy engineers.

4. Under all the considerations above adverted to, and with reference to the entire want of definite and scientific information relative to the applicability of railway communication to India, we deem it indispensably necessary that the subject in all its bearings should undergo the accurate investigation of competent persons on the spot. We propose for this purpose to depute to India a skilful engineer, fully and practically acquainted with the construction and working of Railways in this country, and, if possible, in America likewise, to be associated with two engineer officers in our service, to be selected by you with great care, as fully qualified to conduct the investigation required. One object of this committee will be

to suggest some feasible line of moderate length as an experiment for railroad communication in India.

5. In submitting to us the result of proposed investigation, you will state in what respects the views of the engineers have your concurrence. You will also specify the nature and terms of the charter in your judgement proper to be granted to any Railway Company in India, which may desire to undertake such a Railroad, as well as the mode in which a similar charter from the crown may be best brought into concurrence and harmony with that granted by the Indian Legislature.

6. In the applications on the subject which have been addressed to us, it is contemplated that Railroads in India should be constructed and managed, as they are in this country, by means of private enterprise and capital. In that view of the subject we are disposed to concur. But it will be necessary to make provision, as Parliament has latterly done, that the Government should have the command of railroad communication for its own purposes, on payment of reasonable remuneration, and that at least the great trunk lines should, on settled terms be liable to become ultimately the property of Government.

7. It will be necessary to lay down the rules under which railroad undertakings are to be sanctioned, and with that view we desire that the following may receive your consideration, and that you will submit to us such suggestions as you may have to offer; viz.

1st. That the intended line of communication, in the first instance, and, at a subsequent period, the detailed plans and estimates, be submitted for examination to the Government.

2d. That the constitution and terms of agreement of the proposed Company be in like manner submitted to the Government.

3d. That the books and accounts of the Company be at all times open to the inspection of officers to be appointed by the Government.

4th. That the rate of profit shall not exceed a proportion to be fixed and that the Government shall have power to reduce the rates of conveyance, so that they may not exceed that proportion.

5th. That, if satisfied on these points, the Indian Legislature shall grant a charter of incorporation, and that the Court of Directors shall concur in applying for the grant of a similar charter in England.

6th. That the Government shall, by all proper means, facilitate the surveys and other operations of the Company, as well as the necessary purchase of land, and generally promote the success of the Undertakings.

8. With regard to a guaranteed return on the capital laid out, which the parties who have applied to us request, we consider that mode of co-operation liable to many objections, and likely to prove very unsatisfactory. When the information now called for shall have been received, we shall be prepared to take into consideration the mode and extent of such pecuniary assistance as it shall be proper for the Government of India to afford towards the execution of at least the first approved Line of Rail-road in that country.

9. We feel assured, that you will give your best consideration to the subject now referred to you, as one in which the interests of India are deeply concerned, and that, without loss of time, you will earnestly endeavour to carry with effect the views explained in this letter, and will report the results on our further instructions.

We are, etc.

London
7 May 1845

Sd/-
(H. Willock)
J. W. Hogg etc. etc.

True Copy

East India House,
21 May 1845

T. L. Peacock
Examiner of India Correspondence

Annexure 1B

Excerpts from Lord Dalhousie's Minute of 20, *April* 1853.

5. It cannot be necessary for me to insist upon the importance of a speedy and wide introduction of railway communication throughout the length and breadth of India. A single glance cast upon the map, recalling to mind the vast extent of the Empire we hold—the various classes and interests it involved, the wide distances which separate the several points—which by hostile attack may at any time be captured, the perpetual risk of the hostility appearing in quarters where it is the least expected—the expenditure of time, of treasure, and of life are involved in. Even in the ordinary routine of military movement over such a track and the comparative handful of men scattered over its surface, who have been the conquerers of the country and now hold it in subjection—a single glance upon these things will suffice to show how immeasureable are the political advantages to be derived from a system of internal communication, which would admit of full intelligence of every event being transmitted to the Government under all circumstances at a speed exceeding fivefold its present rate, and enable the Government to bring the main help of its military strength to bear upon any given point in as many days as it until now requires months, and to an extent which at present is physically impossible.

6. And if the political interests of the state would be promoted by the power which the enlarged means of conveyance would confer upon it, military strength, even while it diminished the number and cost of its army, the commercial and social advantages which India would derive from their establishment are, I truly believe, beyond all possible calculations.

... ...

... ...

I trust, therefore, that it may be considered as a matter determined that the limited sections of "experimental" lines which have herebefore been sanctioned by the Hon'ble Court are no longer to form the standards for railway works in India; but that they are to be undertaken upon a scale proportionate to the extent of the British dominion in the East, and to the immediate benefits they are calculated to produce. I conclude that experimental lines of small extent are at this day no longer requisite.

... ...

... ...

Having stated that the construction of an extensive system of railways in India ought at once to be commenced and having further expressed my consideration that the lines when fully established, if prudently and well conducted, will be remunerative to those by whom they may have been constructed and will be productive of infinite advantage to the government as well as to the community...

... ...

... ...

The main consideration which should determine the selection of the great trunk lines of railway in India must be 1st the extent of political and commercial advantages that it is calculated to afford, 2nd the engineering facilities which it presents, and 3rd its adaptation to serve as a main channel for the reception of such subordinate lines as may hereafter be found necessary for special further purposes, or for affording the means of conveyance to particular districts.

Tried by these tests I apprehend that the line from Calcutta by the valley of the Ganges to Delhi, the North West Provinces will stand the first in order of importance and value and ought to command the earliest and best attention of the Government of India.

Touching every important military station from Calcutta to the Sutlej, connecting every depot, Allahabad, Agra, Delhi, Ferozepore, with the arsenal in Fort William, it would enable the Government of India to assemble upon either threatened frontier, or if it were necessary upon both, an amount of men and materials of war, amply sufficient to deal with any such emergency and within a period which would be measured by days, whereas months must elapse with our present means before we could provide military defence.

It only now remains that I should submit to the Hon'ble Court, in obedience to its instructions, my opinion whether railway works in India should be carried on simultaneously, and by what Companies they should be undertaken.

I have no hesitation in recommending in the strongest terms that the several Trunk lines throughout India which have now been suggested and specially the great line from Calcutta to the North West Frontier, should be completed as speedily as may be practicable and to that end the several distinct contacts with different companies of British Architects, I would submit that it is not advisable that too large an extent of railway should be placed in the hands of any one Company; while at the same time economy and public convenience are undoubtedly promoted by as close an approach to inspiring of managements as may be consistent with the exercise of vigilant and observative control over the entire line.

Before concluding this minute it may be convenient to recapitulate the recommendations regarding Railways in India which I beg respectfully to offer to the Honourable Court.

1st That a general system of Railways connecting the several Presidencies, and constituting the great trunk lines within them, should be sanctioned and executed without further delay.

2nd That the Trunk line in the Presidency of Bengal should be carried up the valley of the Ganges to Allahabad and from there up the Doab to Agra and Delhi; with a view of its being extended through the Punjab Westwards as soon as its construction may be found practicable; and that the line to Diamond Harbour should be rejected.

3rd That a junction line should be formed between the above mentioned trunk line and the Presidency of Bombay either by the valley of the Nerbudha or by way of Baroda and Neemuch but preferably by the latter in the first instance, if further examination should recommend it.

4th That in Bombay the Malsej Ghat line should be abandoned.

5th That the Thule Ghat line should not be sanctioned as a great trunk line of communication between Bombay and other parts of India,

6th That a line to Candish and a line to Poone should both be undertaken.

7th That if one only can be chosen the line to Candish should be preferred.

8th That it should not be resolved to carry such line to Candish up the ghats unless a survey of a line by the Taptee river shows the ghat line to be less objectionable than the river line.

That if the ghat line should prove the better, it should not be sanctioned as now proposed by the Thule ghat, unless further survey has established that no better way to the Table land can be found on the Sahyadri ranges and that the present objectionable features in the Thule ghat line cannot be avoided. Lastly, that the same rule should be applied to the line by the Bhore ghat.

5. That a line be formed in the Presidency of Madras by Menil (which point has already been sanctioned) by Vellore, Vaniyambadi, Coimbatore and thence to Western coast, with a branch to Singanallur and a branch also to the foot of the hills towards Ootacamund.

That another line should be constructed in the Presidency of Madras from the city of Cuddapah to Bellary, that surveys should be made with a view to its extension around the table land to Poonah in the Presidency of Bombay in order, thereby to form a junction with the Western Coast.

6. That the construction of these lines should be committed to incorporated Railway Companies under the control of the Government, in the manner in which it has been agreed upon with the East India Railway Company and on such terms as may be fixed.

7. That, if it be necessary to guarantee a certain interest on the capital of the Company measures should be taken to ascertain apportionately the probable amount required for the construction of the line and that the amount of required capital on which interest is to be guaranteed shall be strictly defined; and that the completion of the line should be required within a certain fixed period, under the penalty of a diminution of a certain proportion of the guaranteed interest for every half year in which the line shall remain incomplete after the expiry of the period fixed.

8. That all lines for the present should be formed with a single track, with bridge embankment etc. for the same; land being in all cases taken, and the foundations of extension works laid to suit a double track.

9. That the office of the Company shall be required to the utmost economy consistent with perfect security and efficiency in the original construction of the line, and in all buildings work of every classification connected with it.

10. That no portion of a line should be opened for traffic until the capital amount for that portion of the line shall have been closed in such manner as should be to the satisfaction of the Government of India.

11. That the line shall be opened for the conveyance of passenger and goods should in like manner be managed with the utmost economy in the running expenses, rather than the high rate of speed and frequency of despatch which are the practice on English lines.

12. That the construction of lines be managed on the foregoing principles shall be as conceded to the East India Railway as from Calcutta to Allahabad, one uniform rate of interest being guaranteed upon the capital required for the whole line if a guarantee be indispensable.

13. That the construction of the line from Allahabad to Delhi should be granted to the East India Railway Company or to the Upper India Company but preferably to the former if it will undertake to offer terms as favourable or as nearby favourable as those offered by the latter Company.

14. I have the honour respectfully to submit these several recommendations to the Honourable Court of Directors, and to express my earnest hope that it will resolve at once to engage in the introduction of a system of Railways in the Indian Empire upon a scale commensurate with the magnitude of the interests that are involved and various benefits political, commercial and social which that great measure of public improvement would consequently produce.

Dalhousie 20*th April* 1853

2

The First Lines

East Indian Railway—An Experimental Line

On the recommendation of Col Kennedy, Consulting Engineer, Lord Dalhousie in a minute of July 1850 had sanctioned the construction of an experimental line between Howrah and Pandooah, with earthwork and masonry for a double line and had at the same time approved an extension of the line to Raniganj collieries.

The Government of India (The President-in-Council) conveyed on 6 September 1850 to the Agent, East Indian Railway, their approval to the acceptance of the tenders of Messrs Hunt, Bray and Emslie and of Messrs Burn & Co. the former for the twenty-five (40.25 km) and the latter for fifteen miles (24.15 km) already authorised to be constructed. The tenders accepted included maintenance of the permanent way for three years by the contractors.

In January 1851, the Railway Company first commenced constructing and in September 1854, the line was opened upto Pandooah, a distance of about 37 miles (59.57 km). In February 1855 Lord Dalhousie officially opened at a banquet given at Burdwan, the 121 miles (194.81 km) of Railway from Calcutta to Raniganj, which formed the experimental line. Incidentally, Lord Dalhousie was present at Howrah on that day, but was not well enough to go to Burdwan.

Howrah, on the west bank of Hooghly, was chosen as the terminus for the East Indian Railway and not Calcutta, which had then a population of 5 lakhs, mainly on financial grounds, because of the limited sum of money available, as an experimental line could not be saddled with the financial burden of a heavy bridge over the 1700-ft wide Hooghly river, subject to high tides. The question was, however, raised again and again, as to how the experimental line could be connected with Calcutta. In

May 1854, the Court of Directors put the lid on it by deciding that the project of a suspension bridge should lie over and the railway company should provide two steam boats for crossing the river. A broad bridge was eventually constructed at this point in 1874.

During those four years, that is between January 1851, when the construction of the experimental line started, and September 1854, when the line was opened up to Pandooah, a great deal of attention was given to the size, layout, design and the cost of the terminus at Howrah. The Chief Engineer and the Agent of the East Indian Railway, the consulting Engineer to the Government of India and the Governor-General-in-Council all took lively interest in the project. One Mr Beauchamp acquired some land, became a zamindar, and struck a good bargain. There were two schools of thought : one in favour of a large and elaborate station, with all the services, goods, passengers and parcels, contiguous to one another in one area, and the other in favour of a more modest scheme, distributing these services to different locations, where land could be purchased at a lower price. Today this wrangle over costs, to which the Railway Company and the Government of India were both very sensitive, may appear somewhat ludicrous when it is known that in 1853 a contract was given for the collonade columns of Howrah terminus at the rate of 8 annas (50 paise) per linear foot.

In March 1851, on Col Kennedy's departure due to ill health Maj Erskine Baker was appointed Consulting Engineer and held the post till November 1857. Col Kennedy was so short a time Consulting Engineer, yet during that brief interval he wrote some brilliant reports and obtained decisions on some important questions. In a minute recorded by Lord Dalhousie at Peshawar on 11 March 1851, he paid handsome compliments to Maj Kennedy for his ability, industry and expert knowledge of the subject of railway enterprise in India.

For the second stage of the E.I.R., it had first been proposed to stretch it north-west of Raniganj parallel to the Grand Trunk Road, which was less liable to flooding. But Kennedy, who had succeeded Simms as Consulting Engineer to Government of India in November 1850, suggested a different alignment along the Hooghly to Rajmahal, about 200 miles (322 km) north of Howrah. The advantage claimed for this route was that it passed through a heavily populated area along the Ganges trade route. The second stage of the E.I.R. therefore began not from Raniganj, but from Burdwan. The Raniganj coalfields came to be served by a 36-mile (57.96 km) branch line from Burdwan. Many requests were made for giving access to the collieries from Raniganj. But the Consulting Engineer to Government observed "that the company could not give access to all and ought not to do so to one in preference to others and

therefore the proprietors of several collieries should be left to make their own ways, the company giving a good general access to all, "a policy justified by the passage of time."

A trial trip from Burdwan to Rajmahal was made on 4 July 1860, and the line was opened as far as Rajmahal, by Lord Canning, Viceroy and Governor-General, in October 1860. In commemoration of this event Lord Canning had a medal struck and presented it to all the officials employed at that time on the line. Gold medals were given to Col Baker, Consulting Engineer, Sir Macdonald Stephenson, Managing Director and Agent E.I.R. and Mr Turnbull, Chief Engineer, and silver medals to the rest.

When the experimental line was originally sanctioned by the Court of Directors in 1849, it was given a guarantee of 5 per cent interest on the capital invested. On the extended capital of 3 million sterling at a later date, the rate of guaranteed interest was lowered to 4½ per cent. But subsequently, vide a despatch of 21 December 1855, the Court raised this rate to 5 per cent. Obviously, the lower rate had not been found sufficient to attract more capital that was required for the extension of the line up to Rajmahal. Towards the same end the Court permitted the E.I.R. Company in May 1855 to raise a million sterling upon debentures guaranteed by the East India Company.

In March 1853, Major W.E. Baker, Consulting Engineer to the Government of India in the Railway Department, prepared a detailed report on the result of the examination of certain lines for the extension of railways in the Bengal Presidency during the cold season of 1852-53.

After inspection of the route from Rajmahal to Allahabad, the trial section, the survey of which had already been completed, and of the further stretch from Allahabad to Delhi and onward to Ferozepore, he dwelt on the engineering and traffic aspects of the entire route. Regarding the former, he summed up, "the railway would traverse a country which I can state from personal knowledge to be remarkably free from engineering difficulties".

The Consulting Engineer went into some detail over the prospects of goods and freight traffic. "The quantity of merchandise passing up and down the Ganges valley even now is enormous and that the merchants, both native and European are willing to pay for a safer and more expeditious conveyance than is afforded by the native boats is abundantly proved by the growing demand for freight on the river steamers and by the constant use of the Grand Trunk Road—for the transportation of goods between Calcutta and the provinces as far as Delhi.

"My recent observations have encouraged me to hope that the passenger traffic will be an equally if not more fruitful source of profit.

The population of Ganges valley is remarkably dense, especially along the banks of the river, to which it is attracted by commerce, fertility of soil, and every association connected with the religion and ancient superstitions of the country. This population is very locomotive ; wherever roads exist, they are crowded with travellers ; and the inhabitants of the principal towns freely avail themselves of facilities for increased rapidity of transport afforded by metalled and other well constructed roads.

".........On the Grand Trunk Road, and as I am informed, on other roads in the North West Provinces, the use of staging carriages drawn by relays of horses or bullocks is spreading very rapidly among the natives. Where horses are employed and a rate 5 to 7 miles an hour attained, the charge is 1 (anna) per mile for each individual while in the bullock-carts whose pace may be assumed at from 2 to 3 miles an hour—the fare is half-anna per mile for each person." The Report presented not merely the survey of the proposed lines, but also gave a slant on the social habits of the people of the Indo-Gangetic plain in the middle of the nineteenth century.

All parties concerned with the construction of railways in India acted with promptness and in a business-like manner. So within a week of Major Baker signing his report, the Managing Director and Agent of the East Indian Railway submitted to the Consulting Engineer on 21 March 1853 the estimates of the cost of the first three sections up to Allahabad. These estimates reproduced below were "inclusive of expenses of construction, surveying, management, locomotives, carrying stock and maintenance of 1 year after completion both way and works and including bridging of all rivers except the Son and the Jamuna proposed to be crossed first by ferry" :

Raneegunge section (121 miles)	Rs. 10,799,897	Rs. 89,255 per mile
Section to Rajmahal ($121\frac{3}{4}$ miles)	Rs. 11,456,559	Rs. 93,906 per mile
Section to Allahabad (439 miles)	Rs. 46,285,365	Rs. 103,156 per mile

Rajmahal to Bhagalpur

Bhagalpur both socially and commercially, and conveniently situated for obtaining a share of the Ganges traffic, was selected as the next point after Rajmahal for extension of the railway. Just twelve months after the formal inauguration of Rajmahal by Lord Canning, the line was opened for traffic as far as Bhagalpur in November 1861.

Great expectations had been raised regarding the traffic that would accrue to the railway as soon as the line reached Rajmahal. It was

believed that there was always deep water in the Ganges near this town. According to a report prepared at the time by Col. Forbes of the Bengal Engineers though the main current of the Ganges might desert the city for a time, yet there was no reason to apprehend that the river close to the shore would ever be impassable for vessels drawing 5 ft of water. But shortly after the railway was opened to Rajmahal, the Ganges withdrew from that vicinity and in its wayward course took a different direction altogether. As this unforeseen development caused great disappointment, it was hoped that the opportunity of again touching the Ganges at Bhagalpur was highly desirable.

Bhagalpur District suffered from the uprising of 1857, following the mutiny by the regiment at Dinapore on 25 July of that year, when Sir Henry Lawrence was fighting pitched battles to relieve the beleaguered residency at Lucknow, the bridge work at Kurumnassa was damaged and the work force ran away. When the work at the bridge was recommenced in 1858, Koor Singh and his followers plundered and burnt the store-houses and workshops. Fortunately, the piers of the bridge still 10 ft below the low water mark, were saved. As soon as the insurgents withdrew, the contractors Messrs Hamilton and Nelson resumed the work. It was estimated that the cost of the insurrection to the East Indian Railway Company was 42,000 sterling, but if the delay factor, the excalation of the cost of materials and the wages of labour were taken into consideration, the loss suffered by the Company was 3 million sterling.

Son (Soane) Bridge : 4731 ft (1466.61 metres)

The Son (Soane) bridge, a work of great magnitude, is worthy of detailed description as in the middle of ninteenth century, it could stand comparison with any in the world and provided the model for some other important bridges on the E.I.R., such as the Tonse bridge in Mirzapur district. Colonel Dickens, who examined and surveyed the district through which the Son flows with care and in detail, in his project for canals from the Son thus described the river. "The river rises along with the Nerbudha and Mahanuddee, on the elevated plateau of Central India, and runs 325 miles (532.25 km) through a high rocky tract. After quitting the elevated rocky region of Central India, the Soane enters the valley of the Ganges, and by a straight course of 100 miles (161 km) through the plains of South Behar, joins the sacred river between Arrah and Patna. The chief peculiarity of the river is its great width. Opposite Tilothoo it attains a width of nearly three miles and for the greater part of the 100 miles it is more than two miles wide. This immense bed consists of sand, and during eight months of the year contains a stream of only a quarter

of mile wide, so that it appears to the traveller like a sandy desert. The depth of this wide channel is on the average under 20 ft, and in its deepest parts hardly exceeds 30 ft. The strong dry westerly winds, which prevail from January to April, and sometimes till June, heap up the sand on many parts of the eastern bank to 12 or 14 ft above the level of the country, with a sharp descent upon it at the angle of repose of the material, thus forming a natural embankment for many miles. The drainage area of the Soane is nearly 23,000 square miles. Its extreme discharge in floods is about $1\frac{3}{4}$ million cubic feet per second. The heavy floods, however, are of but short duration, hardly ever exceeding four days ; and the river, even in the rainy season, seldom fills the channel. In the dry season the lowest discharge is usually about 4000 cubic feet per second."

In the middle of the nineteenth century, this was considered a major barrier to the construction of a railway, as a river between two and three miles wide, formed a subject for much thought and examination, but after careful investigation of the banks of the river by Colonel Baker, Consulting Engineer to the Government of India and Mr Turnbull, Chief Engineer of E.I.R., they both came to the conclusion that it would be practicable to construct a bridge at a point where its width was not great, about 4,000 ft and was not very far from the alignment the railway would naturally take. Still the costly nature of a mile-long bridge made the engineers consider. whether it could not by any means be dispensed with, and in Mr Turnbull's report and estimate of March 1853, a break at the Son was included. A break, however, involved station arrangements on either bank and a ferry ; and his estimate amounting to 45,000 sterling indicated that it would probably be wiser to construct a permanent bridge than to adopt a makeshift plan. The idea of a break was not entertained by Government, and at the time that the extension was sanctioned, a bridge over the Son was also approved.

Mr Turnbull had submitted two designs for the bridge, one of brick and the other of iron, recommending the former for three reasons ; first, because an arched bridge for a double line would cost considerably less than an iron bridge for one line ; second, because orders had been issued by the Court of Directors not to ask for anything from England, if a substitute could be obtained in India ; and third, because of the difficulty in obtaining transport for the quantity of iron needed. Afterwards, on Mr Turnbull going to England and conferring with Mr Rendel, the Consulting Engineer to the East Indian Railway Company, an iron bridge instead of an arched brick bridge was preferred—the directors of the company believing that the difficulty of making bricks would be so great that it would take ten years to get the required bricks and materials ready for an arched bridge over the Son.

It was finally decided that brick foundations on wells, with piers of a similar material, should be used to support a wrought iron lattice superstructure of 150 ft (46.5 metres) span each, designed by the late Mr Rendel, carrying the rails on the top and having a roadway for foot passengers on the lower deck. The work was commenced in 1856, and after a slight failure in the manufacture of bricks, the foundations of a pier, composed of twelve wells were sunk. All was going on well when the regiments at Dinapore mutinied on 25 July 1857, and marching towards the west, came to the bridge work, and plundered and destroyed everything. The European resident engineers, their wives and children, together with inspectors and overseers, and their families, escaped in the iron boats belonging to the railway company to Dinapore, and from there to Arrah, where one of the resident engineers had fortified a house. The soldiers, after crossing the river, had been joined by Koor Singh, who laid siege on the house. The small garrison, however, bravely held the place until relieved by a force from the Bengal Artillery.

The Son bridge work was recommenced in November 1858 and the design for the piers was modified. These "were sunk on wells 20 ft in diameter, built on very strong wrought iron curb shoes, having vertical rods attached to them, connected with horizontal rings of iron in the brickwork up to the top of the wells, so as to form a skeleton of iron, which was subsequently enveloped in brickwork "[1] These wells were sunk through the sand, well into the clay, to an average depth of 31½ ft below the bed of the river. "Nothing", said Mr Power, the bridge engineer, "is more trying to the patience than the passage from the sand into the clay. Although the curb shoes may appear to be touching the clay at almost every point of its circumference, the sand will force its way through some small crevices and nearly fill the well again and again."[2]

Bhagalpur to Varanasi

The Son bridge was completed before the rains of 1862 and thus the railway from Calcutta to Varanasi (Benaras), a distance including branches of 609 miles (980.49 km) was officially opened by Lord Elgin, the Governor General and Viceroy, in February 1863.

The total length of the extension line which it was now decided to construct was about 1000 miles (1610 km) and for the purposes of supervision it was divided into two parts, with boundaries coterminous with those of the administrations of Bengal and the North-West Province. Each of these lengths was placed under the charge of a Chief Engineer, controlled by the Lieutenant-Governors of the provinces, advised by their own consulting engineers, the Government of India having considered that the time had

come for entrusting the details of management to local government. This was perhaps the first case of delegation of authority on the Indian Railways.

From Varanasi to Agra there had been no uncertainty regarding the direction of the line, but beyond that point there had been a good deal of thinking and rethinking. It was at one time intended that Jamuna should be bridged at Agra and the line brought by the right bank of that river to Delhi, and then, via Ambala (Umballa) and Firozpur (Ferozepore) to Lahore, crossing the Sutlej at or near Firozpur. The idea of a bridge over the Jamuna at Agra was, however, after sometime given up and it was decided to bridge the river at Delhi and from there the railway should follow the course indicated above. Finally, in 1863, Government of India decided that the line should be aligned along the left bank of the Jamuna, instead of on the right, as had been intended and should be taken to Lahore via Meerut, Saharanpur (Seharunpoor), and Ambala, thus leaving Delhi alone. As soon as this decision had been made, the question at once arose whether it would be worthwhile to make a costly bridge over the Jamuna at Delhi, or whether it would not be wiser to treat Delhi the same way as Calcutta, Varanasi and Agra. While this discussion was going on, the piers of the bridge had been far advanced and the girders too having been manufactured had actually reached Calcutta. Thus it was decided to complete the bridge.

On crossing the Son river, the railway left the Bengal division and entered the North-Western division of the East Indian Railway. The line from Varanasi to Mirzapur (Mirzapore), a distance of 39½ (63.59 km) was opened on 1 January 1864 and upto Allahabad barely three months later. The work between Allahabad and Agra was light and the section upto Kanpur (Cawnpore) had been opened to the public in 1862. Simultaneously work had been going on apace between Kanpur and Agra, which was connected with Allahabad, a continuous line of railway, 280 miles (450.8 km) in length, by April 1862.

Yamuna Bridge (Allahabad)

The bridge over the Yamuna (Jumna) was formed with larger openings than those over the Son, and though shorter in length by 620 yards, was yet a difficult work of great magnitude. The position for the viaduct had been decided as early as September 1855, but in consequence of changes in the chief engineers, the design work was not taken in hand until after the 1857 uprising and the actual work at the bridge was not commenced until the dry season of 1859.

The site for the Naini bridge had at first been selected irrespective of any military considerations, but after 1857, Lord Canning, the Governor General ordered the suspension of the work for a month, while the question was discussed whether this viaduct should not be constructed so as to lead into the fort at Allahabad, or in such a position as to allow the guns of the fort to command the bridge and its approaches. This approach was, however, given up and the site first selected was adhered to. Mr Sibley, the Chief Engineer, had maintained a careful record of the rise and fall of the flood in the river from 1861 to 1864.

The results obtained by him show that there was a variation between low and flood water levels from 30 to 50 ft. The maximum velocity at the height of the flood was 12 ft per second and at the period of greatest discharge, the mean velocity of the whole stream was more than 9 ft per second. The sectional area of the river at that level being 145,000 ft, the discharge of the river Yamuna at highest flood must have been nearly 1.5 million cubic feet per second.

Each pier was founded on twelve wells, resting on strong iron curbs. The wells were sunk to various depths, the maximum being 42 ft, reduced to 22.5 ft in those of the south abutment, but in each case care was taken to sink the piers into the clay, and the wells were all hearted and built up as soon as they were founded.

By August 1862, the foundations were well advanced ; of the thirteen piers ten were completely founded ; one had to be sunk 6 ft, and another 14 ft. The thirteenth pier gave much trouble, as half the wells became disturbed and a coffer dam had to be built before they could be rectified. After the formation of the dam, the water was lowered 9 ft below the low-water level of the river, the wells cut down, and a flooring of large ashlar stones laid over them. On this was sprung an arch of stone masonry 52 ft in diameter over which the pier was built. About 2.5 million cubic feet of masonry and brickwork was used in the bridge and in the north approach there was a viaduct of 24 spans of 30 ft each. The iron work of this bridge, consisting of a wrought iron lattice girder of an open tubular shape, carrying the rail road on the top and a carriage roadway beneath, was designed by Mr G. Rendel.

The total length of the girder was 216 ft, with a clear span of 205 ft. The sides were open lattice, the top and bottom transverse beams supporting the roads. The beams at the top, for the railroad, were 4 ft 6 ins apart, and those at the bottom, for the road, 6 ft. The length of the bridge is 3,150 ft (961 metres).

The first train ran over the bridge on 15 July 1865, and on 8 August the girders were carefully tested with a load composed of five engines and

tenders, exactly covering the span of 210 ft from saddle to saddle, weighing 265 tons on the road beneath, making a total of 330 tons on the span. The train was then run over at speed, and the maximum vertical deflection was only 1.67 inches, the total lateral oscillation being .20 inch or .10 inch either way. As this test was made with a weight far heavier than the bridge would in practice have to bear according to the expectation at that time, the actual working deflection was not likely to exceed 1 inch, a result considered entirely satisfactory. The bridge was opened to the public in August 1865 thus allowing uninterrupted traffic between Calcutta and Agra.

The line from Tundla (Toondlah) to Aligarh (Allygurh), 44½ miles (71.64 km) was opened in March 1863. The pace of work had now become much faster and the section from Aligarh to Ghazibad (Ghazeeabad), 66 miles (106.25 km) was opened to the public in April 1864. Ghaziabad was the junction of the East Indian Railway with the Delhi and Lahore Railway and the stretch to Delhi was then described as a branch line, on which there were two major works, the bridges over the Hindon (Hindun) and the Yamuna.

The work on the Hindon was taken in hand in 1856-60 during which the first borings were made. The abutments and piers were all built on wells sunk to an average depth of 28 ft below low water level ; and on the down side of the steam a continuous line of wells was carried across the river so as to form a curtain. By December 1862, all the arches over the six openings of 70 ft each had been completed and in 1863 the work was finished.

Yamuna Bridge at Delhi

The site for this bridge was fixed in December 1859, and having been shortly after sanctioned by Government, the work began. Nearly all the large bridges on the East Indian Railway were built on wells, sunk either through sand to clay, or resting on sand and silt at a great depth ; but the peculiarity in the foundations of the bridge at Delhi was that rock was found a few feet beneath the bed of the river over a considerable portion of its width. In December 1862, the western abutement was raised without sinking wells from the rock, which was just 3 to 7 ft below the surface. The wells of the pier next to this abutement reached rock at 14 ft, which was considered satisfactory, but as things turned out the wells gave lot of trouble. The floods of 1861 had disturbed them and on examination of the rock down to which they had been sunk, it was found that they were resting partly on a tolerably flat surface and partly on a sharp slope. The wells under the impact of the floods soon became out of the perpendicular, but happily not to such a degree as to throw the centre of gravity outside their base. As they could not be sunk deeper or righted, the engineers decided

that the wells should be so underpinned as to give a full and fair bearing throughout their circumference. Wells of a smaller diameter were also sunk in the interestices between the larger wells, which had gone out of the perpendicular and were connected with them by strong iron bands. The wells were sunk to varying depths from 17 to 39 ft. The bridge was opened for public traffic in 1866, thus completing the last link of the trunk line between Calcutta and Delhi.

Delhi was a fortified city and warned by past dangers the British Government seriously considered that the bridge over the Yamuna as well as the entrance of the railway into the fort of Salimgurh and the palace should be made defensible. But the idea of a bridgehead was abandoned on the grounds of cost and it was considered that it would suffice if the railway bank of the approach was undermined by a girder drawbridge. The roadway of the bridge was protected with strong iron gates. The entrances of the railway line through the ramparts of the fort and the walls of the palace citadel were protected with similar barriers, and commanded by batteries and a retrenched front, specially constructed for the purpose. All the stations in the North-Western Provinces were so designed as to be defensible.

The bridge consisted of 12 main spans of 214 ft. each, of lattice type girders and 2 spans of 46 ft each, making an overall length of 2,704 ft. Like the Naini bridge at Allahabad, it carried a double line of railroad above a roadway.

The Great Indian Peninsula Railway

As already stated in Chapter One, the Great Indian Peninsula Railway was first to run a train for the public on the Indian subcontinent in April 1853. Preliminary steps for the formation of the GIP Railway Company had been taken in England ten years earlier and its prospectus found a place among the papers forwarded to the Governor-General-of-India-in-Council by the Court of Directors of the East India Company in their despatch of 7 May 1845 (Annexure 1-A).

In 1843, Mr. C. T. Clarke, a Railway Engineer who had been employed on the Great Western Railway in England, came out to Bombay, to study the facilities for railway construction from that port to the districts above and across the Western Ghats. Mr. Clarke originally advocated the construction of a railway branching off into two lines from Kalyan over the Western Ghats, one to the north-east by the Thal Ghat and the other to the south-east by the Bhore Ghat, in the direction of Poona and Madras.

By 1845, the Great Indian Peninsula Railway project, although still adhering to its ambitious name, came to restrict its scope to a system designed only to connect with Bombay the principal producing districts situated at a reasonable distance beyond the Ghats. In that year, a line was

surveyed from Bombay to Kalyan, and up the Sahyadri Range by the Malay Ghat from the top of which it was to branch northward and southward. In 1849, the Great Indian Peninsula Railway Company entered into a contract with the East India Company for the construction of an experimental line 35 miles (56.35 km) long, calculated to cost £ 500,000 to form part of a trunk line connecting Bombay with Khandesh and Berar and generally with the other presidencies of India. The terms involving Government guarantee on which the Company should operate were decided upon on 17 August 1849, when a legal agreement was signed with the Great Indian Peninsula Railway Company. The contract was to run for 99 years, with provisions enabling the Government to purchase the line at the end of 25 or 50 years. Interest at 5 per cent on the capital of the Company was guaranteed until acquisition by the State.

The surveys, for the first section of the line, namely from Bombay to Thana, were commenced early in 1850. The plans were finalised and tenders invited by September of the same year. The works began in 1851 and were finished early in 1853. The first passenger train that ever ran in India was on this section on 16 April 1853.

It is surprising that the first railway train in India ran from Bombay and not Calcutta in spite of most of the preparatory work for the construction of railways in India having been done in Bengal Presidency. There were several reasons for this. First, the Bombay project of the Great Indian Peninsula Railway Company, incorporated in England, received strong support from the Liverpool cotton interests, looking for new sources of raw cotton and anxious to exploit the vast potential market for cotton piece-goods produced in their mills. Second, considerable local sentiment had been built up in Bombay in favour of the early construction of railways by holding public meetings, as early as 1845, while no such attempt at creating public opinion had been made in Calcutta. Third, Bombay, due to its distance from Fort Williams enjoyed a certain amount of freedom to act as evidenced by the minute dated 3 March 1852, recorded by Dalhousie, "I do not understand that it was intended that the Supreme Government should exercise over the Bombay line the same control in detail as it exercises here (Bengal)." Fourth, things moved at a fast pace in Bombay as soon as the Great Indian Peninsula Railway Company sent out its Chief Resident Engineer, who surveyed the Bombay-Kalyan line in 1850. In fact, according to a letter dated 31 January 1853, from the Superintending Engineer, Railway Department, Bombay, Capt J.H.G. Crawford, to the Secretary to the Goverment of Bombay, the line upto Kalyan (Callian) had already been constructed. In this letter, Capt Crawford pleaded strongly that the GIP Railway should be allowed to proceed beyond Kalyan with the line according to its designs. This letter concluded : "In conclusion, I think it may be granted that the construction of a line of Railway into Khandesh, as proposed by the Railway Company via the Thal Ghat, is of direct and

immediate consequence to Bombay...One of our richest provinces on this side of India is approached by the most direct route. The country onwards from Khandesh appears to offer every facility for the expansion of the line to the Eastward so that we may hope to fall in with the Calcutta line in the extension to the North Westward and thus complete the communication between Bombay and Calcutta by rail..."

There was an argument whether the line from Bombay to Thana should be single or double. Originally the contract was for a double line. As in Bengal it had been decided to construct a single line except for bridges for which provision should be for double line, it was considered that the same pattern should be followed in Bombay presidency. But in view of the complications that would arise in relation to the contract and the compensation that would have to be paid to the contractor, Government of Bombay finally decided in 1851 to retain the double line.

At Thana, the line crossed an estuary to the mainland of India, and following a north-westerly direction, went upto Kalyan, the end of the first section of the railway, which was completed by 1 May 1854. From Bombay to Kalyan, a double line was laid. The gradients were much steeper than those employed in northern India, the steepest incline being 1 in 150.

The Battle of the Ghats

A fierce controversy raged for some years over the choice of the direction that the line should take beyond Kalyan. The objectives were to construct two lines, one in the north-easterly direction towards Nagpur and Calcutta and the other in the south-easterly direction towards Pune (Poonah) and Madras. While the former was to follow a track over the Thal (Thull) Ghat, the latter was to run over the Bhore Ghat.

The task of the early builders was not an easy one. Their first major hurdles were the physical obstacles which had to be encountered and overcome. The Thal and the Bhore Ghats consisted of a continuous deep chain of massive, solid impregnable rocks and lofty peaks, rising abruptly to heights from two to four thousand feet. Except for a few pony tracks and a rough craggy road serviceable during a few months of the year for bullock-carts, the ghats were a mass of thick impenetrable jungle infested with wild beasts hostile to human habitation. A few hundred miles of upcountry beyond the ghats lay the Vindhyachal mountains obstructing the route to the north and the east on the one hand, and to the south on the other.

Surveys made of the Thal Ghat and the Bhore Ghat revealed that both the routes bristled with difficulties of such magnitude that the engineers were daunted by the height of the mountains, the dense jungle growth and the deep ravines. Mr James Berkeley Chief Engineer of the GIP Railway considered the Thal Ghat unfit for a railway line. His opinion of the Bhore Ghat was not very different, for though agreeing that it was possible

to reach a certain height on the cliffs by a spur which projected into the plains, "yet the ground above, a part of which is traversed by the present road, is for six or seven miles almost, if not quite, impracticable." Cautioned therefore by these hurdles, Mr Clarke thought that it would be better to construct one line only, up the ghats, and then, having reached the summit of the tableland, to take one branch towards Calcutta and another towards Madras. By this means he hoped to confine his difficulties to one set of inclines requiring the aid of an assisting engine to push trains over them. With this object he selected the Malsej Ghat, midway between the Thal and Bhore ghats and made a complete survey of a line up it.

But not long after, the Malsej Ghat was given up as it involved an incline of 6 miles with a gradient of 1 in 18. More careful survey revealed that heavy tunnelling works were involved and piercing one of the tunnels would take seventeen years and put up the cost by 384,000 sterling. Lord Dalhousie, in his minute of 20 April 1853 also rejected it. Malsej Ghat route was thus finally abandoned.

Though the Malsej Ghat was out of the way, yet both the Thal and Bhore ghats held out frightening prospects of construction and monetary risks for the British engineers. Lord Dalhousie's comment on the subject was also cautious and non-commital. Colonel Kennedy, erstwhile Consulting Engineer to Government of India had joined the Bombay, Baroda and Central India Railway Company and produced a paper condemning the extravagance of his brother engineers and denounced as preposterous the idea of carrying traffic up the ghats.

He proposed an alternative, a line along the coast to Surat and onwards by the Taptee and Godavary rivers to the eastern shore of India, and further parallel to the coast to Madras. This proposal was rejected by Lord Dalhousie in his minutes of 20 April 1853, but he accepted that the line from Bombay towards Madras should mount the ghats. He directed a thorough examination the Sahyadri range so as to prove conclusively that no better route than the Bhore Ghat was feasible.

Lord Elphinstone, Governor of Bombay had given his blessings to the Taptee route as the one which should be eventually extended to Calcutta. He advised that a guarantee should be given both to the line via the Thal Ghat and to that by the Taptee, as far as Jalgaon ; and for further extension to both companies jointly, or to the one which first reached Jalgaon.

Lord Dalhousie hesitated to sanction the Thal Ghat scheme and ordered that a thorough survey of the Taptee line proposed by Colonel Kennedy be undertaken and if the Ghat must be mounted, satisfactory proof should be available that no route better than the Thal Ghat could be obtained.

In accordance with these orders accurate surveys of various ghats, both towards the north and the south were undertaken by Mr. Berkeley,

and of the river route by Col Kennedy ; so that on the submission of authoritative reports on both the proposals, Government of India should be in a position to determine which route would be the most profitable and valuable to the general interest of the British Empire.

The North East Line

The point at which the rival lines would converge was Jalgaon (Julgaon) on the Taptee and the comparison had to be drawn between the advantages in their favour from Bombay to that point, as beyond it, the same direction would be followed by either line. The Great Indian Peninsula Railway had some time previously been opened for a short distance from Bombay to Kalyan and as it had been decided at that point of time that this portion of the railway must be common to any line entering the island of Bombay, the distance and calculations were based on this assumption.

Mr. Berkeley's surveys proved that the adoption of the Taptee route would entail 131 miles (211 km) of additional line of railway, and would cost 1,098,000 sterling more to execute, estimating either line to cost 7,337 sterling per mile, inclusive of the extra cost of a double line over the ghat.

There would be saving in time by the shorter Ghat route and this was estimated at about five hours for passengers and between seven and eight for goods. In addition, savings of 43,000 sterling in working expenses per annum were expected on the ghat route as compared to the Taptee line. The increased cost on the capital outlay and permanent expense of working the Taptee line were likely to diminish the prospects of satisfactory profits.

In the light of these facts Lord Dalhousie finally withdrew his objection to the Ghat route and went on record : "I am altogether unable," he said in a minute dated 19 July 1855 "to concur in the opinion of the Governor of Bombay, that a guarantee might safely be given to both the lines which are competing for the communication between Candeish and the coast. Unnecessary and multiplied competition between railway companies has been the bane of that class of enterprise in our own country (England). The supposed advantage of railway competition to the public, whom it seems to serve, has long been perceived to be an utter delusion. I trust that the Government of India will take timely warning, and will not only lend no countenance to the so called competition of railway companies in this country, but will steadily discourage it, looking to secure the interest of the public by other and more reliable means".

These opinions were recorded in 1855, but the sanction of the Court of Directors to the Thal Ghat line was not given till 31 January 1856. A final decision was thus at last reached, after prolonged investigations by

engineers caused by Lord Dalhousie's circumspection, to allow such an incline as the Thal Ghat on the route of the main railway line between Bengal and Bombay. Later, as it was shown that gradients and curves could be so improved as to make it a safe and practicable line of communication, many of the objections to the route were at once removed. As nearly all the heavy goods traffic would come from the Deccan to Bombay, the fall on the Ghat, on a long incline of 1 in 100 for eighteen miles, would suit the conveyance of goods in that direction. It was also appreciated that the passenger trains could as easily mount the ghat incline as they had ascended similar short gradients in England.

The Thal Ghat incline measured a total length of 9 miles 26 chains,[3] of which 3 miles 27 chains are straight, and 5 miles 79 chains curved. The sharpest curves are 17 chains radius for a length of 33 chains and 20 chains radius for a length of 47 chains. The steepest gradient is 1 to 37 for 4 miles and 29 chains, followed next by another 1 in 45 for 14 chains. The ghat line has numerous cuttings, embankments, viaducts and tunnels. It has other interesting features, such as a reversing station to avoid a sharp curve and a *corkscrew*, that is a line winding round and round the main hill. The Thal Ghat incline called for much skill and ingenuity and was rightly described as a feat of railway engineering. After climbing the Thal Ghat, which was completed in 1865, the line was extended to Igatpuri (Egutpoor-rah), a distance of 51¾ miles (83.32 km) from Kalyan.

From Igatpuri to Manmad (Munmar) a distance of 77 miles (123.97 km), there was no major engineering difficulty. The only large bridge was a viaduct over the Godavari, 145 yards in length, consisting of nine 40 ft arches. From Manmad to Jalgaon, a stretch of 99½ miles (160.19 km), the line was completed in 1862. In fact, the work on these lines had been going apace while the engineers were struggling to lay the track through the steep hills and the deep forests of the Thal Ghat. The progress on the relatively easy terrain was fast and by 1863, the gap of 15 miles (24.15 km), on the main line between Jalgaon and Bhusawal had been bridged.

The 243-mile (391.23 km) line from Bhusawal to Nagpur (Nagpore) then called the Nagpore Branch, took four years to build from 1863 to 1867. Its importance lay in the fact that it passed through a district in which the best and the largest cotton crop in India was produced. While the branch was under construction, the main line had advanced to Khandwa (Khund-wah) 77 miles (123.97 km) away, during 1865-66. About three miles after leaving the small town of Burhanpur (Burhanpoor), the line climbed the Satpura (Satpoorah) range for a length of 12 miles. Considering that it had to ascend and traverse continuous mountainous country for over 50 miles, the curves and gradients were kept reasonably easy.

Beyond Khandwa, the line entered the valley of Narmada (Nerbudha) river and ran along its left bank for about 200 miles (322 km), nearly as far as Jabalpur (Jubblepore). In 1868, the line had progressed as far as

Bir, 21 miles from Khandwa. The country traversed was flat, but there were heavy bridge works over a number of streams, notable among them being the river Gunjall, whose floods rising upto 40 feet had to be cleared.' The line upto Sohagpur (Sohagpore) was opened on 1 February 1870.

From Sohagpur to Jabalpur a distance of 119 miles (191.59) km the ground was generally level and of a favourable character, cut up at intervals by ravines, liable to sudden and high floods. After crossing Narmada, the line passed over nearly flat country to Jabalpur, the meeting point as then determined between the GIP and the EI Railways. Beyond Jabalpur, the line had to pass over a number of streams flowing into the Narmada, but the gradients and curves were easy. Leaving the valley of the Narmada, it gradually ascended the Kymore hills, involving neither steep gradients, nor river crossings of magnitude. It was easy work and, therefore, completed a month after Sohagpur, that is by March 1870. The line from Jabalpur, to Naini, which then formed a part of the East Indian Railway, had been opened to public traffic during the summer of 1867.

The South-East Line

The railway network in India, as conceived by the early builders, was to include a line from Bombay towards the north-east to join up with the East Indian Railway and thus eventually to establish a through connection with Calcutta, and another line towards the south-east to link up with Madras. We have already traced the course of the construction of the north-east line as far as Jabalpur, which has then determined as the meeting point with the East Indian Railway. We now turn to the South-east wing of the Great Indian Peninsula Railway and follow up its progress as far as Raichur.

While a good metalled road, described by Mr. J. Berkeley, the Chief Engineer of the Great Indian Peninsula Railway, as "a masterpiece of engineering", had been built upto the Thal Ghat under the orders of the Government of Bombay some few years before the railway era, and was used for the conveyance of the mail from Bombay to Calcutta, the old Bhore Ghat road was not so good and its wretched condition attracted, at the beginning of the eighteenth century, the attention of the Duke of Wellington, who caused a road practicable for artillery to be made from the foot of the Ghat to Poona. This was, however, comparatively a small improvement on the old path, and the road was still barely passable for wheel carriages. Subsequently on 10th November 1830, Sir John Malcolm opened the Bhore Ghat road for cart traffic, and recorded a minute replete with encomium and satisfaction at the finished work.

"On the 10 November", he said, "I opened the Bhore Ghat, which, though not quite completed, was sufficiently advanced to enable me to

drive down with a number of gentlemen in several carriages. The height of the mountain is nearly 2000 feet (610 metres), and the length of the road is $3\frac{3}{4}$ miles (6 km). It is impossible for me to give a correct idea of this splendid work, which may be said to break down the wall between the Concan and Deccan. It will give facility to commerce, is the greatest of conveniences for troops and travellers, and lessens the expenses of European and other articles to all who reside in the Deccan. This Ghat will besides prove a positive creation of revenue, for I am satisfied, from the decrease of hamallage, and the offers already made to farm the duties, that the first year will produce twenty thousand rupees, and that the ordinary revenue will hereafter rise to more than thirty thousand ; while on any military operations occurring in a quarter which required the troops in the Deccan to move, the outlay would be paid in a twelve-month by the cheap transmission of stores. That Government have had such a return for the lac of rupees expended on this work is chiefly to be ascribed to the enterprise, skill, and unwearied industry of the contractor, Capt. Hughes."

According to Mr Davidson,[4] the work which was thus highly eulogized, was merely a mountain road, ankle-deep in dust in the hot season, and a mass of mud in the monsoon, with frequent interruptions by torrents, which cutting through the track rendered it dangerous and hardly passable from boulders and masses of rock. Mr. Berkeley differing much from Sir John Malcolm, described the Bhore Ghat road as steep, tortuous, ill-made, and less skilfully constructed than the Thal Ghat road.

Further surveys were carried out and one of the routes considered was over the Kusoor-Ghat, but a minute examination resulted in its condemnation. The Bhore Ghat was, therefore, accepted by the Government of Bombay as the pass for the south-east extension and directions were given in October 1854, to that effect, as well as for the laying out of the lines both below and above the ghat.

Returning then to Kalyan (Callian) the point from where the lines from Bombay towards Calcutta and Madras diverge, the first section was from Kalyan to Palasari (Padushuree) where the incline commences. Here a small station, called Karjat (Kurjut) was placed on a piece of level ground, on which descending trains would stop. This station was 196 feet above high water level at Bombay, while the top of the Bhore Ghat was 2027 feet ; so the actual height surmounted at the incline itself was 1831 feet, the average gradient being therefore 1 in 46.

On leaving Padushuree, or Dhyolee, or Kurjut (this place was called by three different names), the line kept to the western flank of the great spur, here called the Sangiri Hill, and for the first four miles it had to encounter very heavy works, which on the second survey of the hill, were found to be necessary in order to ease the steep gradients first laid out.

Supported by some heavy embankments, the line ascended the incline spanning a number of viaducts and running through a succession of tunnels until it entered upon a long and tolerably level neck, forming the link between the spur up which the line had been travelling and the main ghat itself. At the end of this neck, at $11\frac{1}{2}$ miles, a reversing station was placed. The course of the line, leaving the reversing station, pierced the Elphinstone Point by a long tunnel of 346 yards and then keeping along the edge of the great ravine called Khandala, passed the station of that name ; and so following the direction of the main stream of the ghat, reached the crest of the Bhore at the village of Lonavla (Lonowlee).

There were in all twenty-five tunnels, of a total aggregate length of 3986 yards, or more than $2\frac{1}{4}$ miles,(3.62 km) six of them being more or less lined with masonry for a length altogether of 312 yards. The viaducts were eight in number. The length of the incline was 15 miles 68 chains, of which 5 miles 34 chains was straight, and 10 miles 34 chains curved. The sharpest curves were one of 15 chains radius for a length of 22 chains, and another of 20 chains radius for 10 chains. The steepest gradients were 1 in 37 for 1 mile and 38 chains, and 1 in 40 for 8 miles and 4 chains, the remainder being between 1 in 42 and 1 in 75.

A double track was laid throughout the incline, and cost was 68,750 sterling per mile, or in all about 1,100,000 sterling. The comparative cost per mile of building a railway on plain country at that time varied between 10,000 and 20,000 sterling. The tunnels presented the greatest difficulties to the contractors, as they nearly all contained trap rock, usually of a very hard character. From the precipitous forms of the hills it was generally impossible to sink shafts, and the drifts had therefore to be driven solely from the ends, much skill and care being required in setting out the work on the sharply curved inclines, so as to ensure perfectly true junctions.

The viaducts were partly of block in coarse masonry, an abundance of admirable building stone being locally procurable ; but the building was not always satisfactory ; consequently there were some failures, such as the Mhow-ke-Mullee viaduct, which had to be rebuilt. Another cause of trouble was the dangerous slips which happened when the boulders with which the mountain sides were covered lost their support by the excavations in the cuttings below, or were loosened by the action of the rains and rolled down towards the valleys. The engineers, Mr. Berkeley and Lieutenant J. D. Swiney, R.E., thus described another peculiarity ; "...the ground along with flanks of the Ghat mountains is often of so precipitous a character that we have met with frequent cases where, on the upper side, we have only a low embankment, while on the other side the bottom of the slope would be of an impracticable depth unless it were retained by a strong wall of masonry. In some situations we met with the extraordinary

circumstances of one-half of the line being upon rock benching, and the other half consisting of a very lofty embankment, or of a high embankment retained by a wall of masonry. In other places, again, we have found the mountain sides so steep as to render it inadvisable to encounter the difficulty of embanking the line or building battering walls, because they would be of enormous height above the surface of the ground, and would have to be carried down to a great depth beneath it before a secure foundation could be obtained for them. Under this peculiar state of things we have determined to place the line upon arches or vaults. These will sometimes be of a novel description, for we shall have here and there to place one-half of the width of the railway upon rock benching, while the other half will stand upon vaulted arches."

The landslips were particularly troublesome in the lower portion of the incline, and there were several instances of open cuttings filling up, necessitating the driving of a tunnel of arched masonry through the debris which had fallen. Such unexpected works delayed the final opening of the incline. The work, therefore, took seven years and a quarter to complete, and was executed entirely by contract. In June 1858, 2 miles (3.22 km) of the upper part of the incline, from Khandala to Lonavla was opened for traffic. In March 1859, the contractor gave up and for a short time the engineers of the railway company carried on the work themselves. In the same year it was re-let on contract and was actually completed by Messrs Adamson and Clowser, who carried on their arduous undertaking with the greatest industry and ability. They employed a strong force of labour, the average number of workmen being 25,000, while in 1861 more than 42,000 men were employed on the works.

The line from Kalyan to Lonavla was completed and opened by May 1863. But in the intervening years since the commencement of the work in 1856, the stretch from Khandala to Pune (Poonah) and its further extension to Sholapur had been completed by the middle of 1860. After that there was a long pause and further construction was not taken up till 1870, during which the line was completed upto Krishna.

Bombay-Madras Connection

The 1857 war of independence had given a severe jolt to the extension of railways in India. Money became scarce and had to be conserved to meet the guaranteed interest on lines already working and under construction. A connection between Bombay and Madras had, therefore, to be deferred and was not surveyed till 1863, although a trunk line between these two cities had been one of the schemes originally sanctioned as a part of the comprehensive network of railways in India.

In the original scheme, the trunk line from Bombay was intended to be taken via Sholapur, Mogdul, Bellary and Cuddapah to Madras ; but subsequently, the Governments of Bombay and Madras jointly advocated that the line should pass through Hyderabad and from there advance to Cuddapah. Though the latter would have been a longer route, military considerations were in favour of passing the line via Hyderabad, which was the largest military station in Southern India.

The routes had been surveyed – the original routes from Sholapur, via Mogdul and Bellary, to Cuddapah, and an alternative route, also from Sholapur, but taken via Gulbarga (Kulberga) and Raichur (Raichore) to Cuddapah. The Government of India decided "that the guaranteed main truck line of communication between Bombay and Madras should follow the second of the direct alternative routes which had been surveyed, viz. that by Kulberga and Raichore ; that a guaranteed branch line should be constructed from some junction near Gooty to Bellary ; and that if any company should be formed to make a branch from Kulberga to Hyderabad, it should receive a subsidy. It was also decided that Raichore should be the point of juction for the Bombay and Madras railways."[5]

The distances on the three routes under consideration were :

1. Main Line via Hyderabad	556 miles (895.16 km)
2. Main Line via Mogdul	517 miles (832.37 km)
3. Main Line via Raichur	504 miles (811.44 km)

The Raichur route was considered the most advantageous as due to its shorter length, it involved the least expense on the mileage that had to be covered by a government guarantee. There was initially some hesitation in locating the line through Raichur, which was situated in the territory of the Nizam of Hyderabad but it was later realised that this disadvantage applied with greater force to the city of Hyderabad.

The line from Sholapur to Raichur a distance of 160 miles (257.6 km) did not present any difficult engineering problems and was opened on 1 May 1871. Further on, it was carried upto the river Tungabhadra (Toongabudra) by the Madras Railway Company without any works of importance, on its way to Cuddapah. The bridging of Tungbhadra with its bold and well-defined banks did not present any problems and a viaduct of fifty-eight openings of 64 feet each spanned by wrought iron girders was erected and completed in 1871. After passing the river the line running nearly due south joined up with the town of Gooty. From the nearby station of Guntakal, a 35-mile (56.35 km) branch was laid to the important military station of Bellary. This was also built by the Madras Railway Company, whose North-west line from Madras to Raichur had been opened in March 1871.

Bombay, Baroda and Central India Railway

The GIP and the BB&CI have been old rivals. Interestingly, the competition between the two companies started in 1855, when the former was trying to obtain approval for the extension of its line beyond Kalyan over the Ghats. At that time a rival jumped into the fray and claimed that a different route from Bombay to Vadodara (Baroda), avoiding the steep gradients of the Ghats, to ultimately link with the EIR, which was also the intention of the GIP, would be preferable.

The Bombay, Baroda and Central India Railway Company was organised in 1852 and the East India Company authorised it in August 1853 to survey lines from Bombay via Surat, Baroda and Neemuch to Agra ; and from Surat by the Valley of the Tapti, into Khandesh, with an extension to the Valley of the Narbada. The results of these surveys, reported by Colonel Kennedy, the Consulting Engineer to the company in 1854, were considered favourably as regards the coast line from Bombay to Baroda.

The decision of the Court of Directors of the East India Company to permit the Bombay and Baroda Railway Company to make a line on the usual terms of guarantee from Surat to Ahmedabad via Baroda was given in April 1855 and the Governor-General was informed on 2 January 1856 that the Court had entered into a deed of contract with that company to undertake construction and working of the line from Surat to Baroda. The Government of India sanctioned the commencement of the works which were to be carried on under the direct management of the railway engineers without the intervention of a contractor.

The original contract with the Bombay, Baroda and Central India Railway Company was for a period of 99 years from 21 November 1855, after which the line was to become the propèrty of the Government on payment of the actual capital outlay. The contract was terminable by purchase after 25 or 50 years.

The Company broke ground on the first section of the Surat-Broach line on 1 May 1856. The terminus of the BB&CI was first fixed at Grant Road, not far from the Byculla Club and the race course with the intention of eventually extending its line through the reclaimed land in Back Bay to a permanent terminus in Colaba. The first bit of track to be completed by the BB&CI Railway was the section from Utran (Utrain) to Anklesvar which was opened on 10 Febuary, 1860. Further sections were added north and south of Anklesvar so that the line was connected between Bulsar and Vadodara, 123 miles, (198.03 km) by the end of 1861.

In a letter the London Board of Directors of the Company wrote to their Agent in India in 1861, they observed : "The Directors are very gratified that a train of 72 vehicles containing nearly 4,000 passengers and,

including engine and tender, weighing 720 ton, was drawn by a single engine at 20 miles (32.20 km) an hour from Surat to Baroda".

The difficulty of the line beyond the Suburbs of Bombay was the enormous quantity of bridging required, which in the aggregate, amounted to 6 miles in length. Colonel Kennedy considered that piers and abutments of masonry would be quite inapplicable to bridges over the rivers crossed by this line flowing through alluvial plains or inundated districts. He, therefore, determined to use an adaptation of Mitchell's hollow screw piles for piers and abutments, and girders of a uniform span of 60 ft.

Bulsar was connected with Bombay in November 1864 and by 1870 BB&CI's main line from Bombay to Sabarmati 325 miles, (523.25 km) had been completed. The Railway built its terminal in Bombay area at Grant Road and two years later shifted it to Churchgate. The cost of the finished line was £ 24,000 a mile, and it was, therefore, one of the most expensive railway lines on flat country during the first phase of the construction of railways in India. The average cost of such lines upto 1868 was from £ 10,000 to £ 20,000 per mile.

NOTES AND REFERENCES

1. Railways of India by Edward Davidson ; London, 1868.
2. Ibid.
3. 1 chain = 66 feet = 20.46 metres.
4. Railawys of India : Davidson.
5. Ibid.


Railways of INDIA
1868
REFERENCE.
Railways opened
— Do. — under construction
— Do. sanctioned and being Surveyed
— Do. — projected by Col. J. P. Kennedy
The Map is intended only, to exhibit the principal places, chief rivers &c. of India.
Scale 120 Miles - One Inch
BOKHARA
KOONDOOZ
BELOOCHISTAN
SINDH
RAJPOOTANA
ARAVALLI HILLS
VINDHYA MOUNTAINS
SATPOORAH
DELHI
AGRA
ALLAHABAD
LUCKEE SERAI JUNCTION
JUBBULPOOR
BHOSAWUL JUNCTION
NAGPOOR
CALCUTTA
DACCA
BOMBAY
HYDRABAD
RAICHOOR JUNCTION
GOOTY JUNCTION
ARCONUM JUNCTION
MADRAS
MALABAR COAST
COROMANDEL COAST
NORTHERN CIRCARS
ARABIAN SEA
BAY OF BENGAL
INDIAN OCEAN
Gulf of Cutch
Gulf of Cambay
Gulf of Manar
Palks Strait
Mouths of the Ganges
LACCADIVE ISLANDS
MALDIVE ISLANDS
Eight Degree Channel
Cape Comorin
CEYLON

3

A Network Is Built

Railways in the South

Railway construction in the South had a chequered history, consisting of many ups and downs. As early as 8 May 1845 the Madras Railway Company was formed in London. This Company designed a line from Madras to Walajah Road (Wallajannggur), then better known as Arcot, a military town.

Mr Simms, the first Director of the Indian Govt Railway Department favoured the scheme and considered it expedient, but he was of the view that the mode of construction should not be left to the opinion of any engineer who might be employed by the railway company, but thinking that the lines will eventually become the property of the Government and would become a part of a general system of railways intersecting India in all directions, not only should the railway be constructed in accordance with Government specifications but the entire working and upkeep of the line should be subject to the control and supervision of the Government. Besides this the railway company was to furnish returns, statistical and others, which the Government might require.

These stipulations did not materially differ from those which had been made by the Government with the railway companies in Bengal and Bombay presidencies, but the advantages which Mr Simms recommended in favour of the company were small and few compared with those which had been conceded elsewhere. There was to be no guarantee of interest, no gift of land free of cost ; but on the contrary the Railway company was to be allowed to construct a line on a lease, the period of which was to be determined after ten years' experience of the result of the opened line, on the basis of the profit of the preceding three years. The duration of the

lease, however, was to be so fixed as to provide a fair percentage of profit on the capital and a redemption of the capital thereafter. At the expiration of the lease, the whole of the railway and its appurtenances were to become the property of the Government without any compensation, except perhaps for the plant, which might be taken at a valuation.

These proposals, so one-sided n their intent, and based on the assumption that the railways in the South would be highly remunerative, while in fact this was quite uncertain, were not likely to meet with such favour. The Madras Railway Company having been unable to obtain any pecuniary concession from the Court of Directors, was shortly after dissolved and it was not until after the experime al lines had been sanctioned in Bengal and Bombay, with a guarantee of i erest on the paid-up capital, that the subject of a railway in Madras was revived.

The scheme of constructing a line from Madras to Walajah Road was again taken up in 1849 and received the support of the Court of Directors but was opposed by the Board of Control. This see-saw battle went on until one Major Pears was appointed Railway Construction Engineer to the Government of Madras.

Major Pears of Madras Engineers, made, *inter alia,* the following observations in this context : "I believe these—the indirect results of the operations of railways inestimable as they are --to be by far the most important. I believe the best interests of Government to be identified with those of the people and I think, therefore as I have elsewhere observed that we are in danger of doing great injustice to the people of this country by looking upon these great works as mere commercial speculation, and by meeting every railway project with the condition that it shall at once pay its own expenses together with the interest of the money laid out on its construction.........

"The operations of railways are essentially peaceful. They have arisen out of and naturally belong to an era of peace, civilization and commerce ; and their maintenance and use as a means of communication appear to be in a remarkable manner dependent upon the will and pleasure of the people. Although, therefore, they greatly tend to facilitate the preliminary arrangements for aggressive war ; and perhaps, though in a less degree, contribute vigour and efficiency to preparations of a defensive character, we cannot with any safety calculate upon them in the case of active operations within our own frontier, or venture in reliance upon them, to reduce materially one garrison. They will, we may hope, though indirectly and remotely affect the strength of the army by so operating upon the character and pursuits of the people as to render so large a body of disciplined troops unnecessary."

This enlightened piece of writing, placed on record at about the same time as Lord Dalhousie wrote his celebrated minute of 20 April, 1853 (Annexure 1B), was a significant contribution to the formulation of the philosophy that governed the construction of the first railways in South India. Examples of similar emphasis on the concern for the public weal could be found in other parts of the country also ; for example, in the controversy between the two alternative routes north of Burdwan on the East Indian Railway, preference was given to the one that ran parallel to the Hooghly and joined the Ganga at Rajmahal, over the extension of the experimental line from its initial terminus at Raniganj in a north-westerly direction towards Varanasi. While the latter route was shorter, the former had the advantage of passing through the heavily populated Gangetic plain with a number of large commercial centres.

After much careful investigation, Major Pears came to the conclusion that one trunk line should run from Madras to Malabar Coast via Vaniambady, Salem and Palghat, that solitary and remarkable gap in the Western Ghats, and the other should diverge from the first line at a point 70 miles due west of Madras, should climb the Eastern Ghats near Polmanir, and should be carried via Bangalore, to Bellary and from thence to Poona and Bombay. The Madras Government approved both the schemes.

In a Memorandum prepared by the Secretary to the Madras Government dated 29 April, 1853, he observed as follows :

"The general system of Madras Railroads seems to me thus :

1. A line from Madras to Cuddapah and Bellary, 316 miles (508.76 km) ;
2. A line from Madras by Vaniambady, Salem, Coimbatore to the west coast at Calicut ; or Cochin, 428 miles (689.08 km) ;
3. A Branch from No. 2 at Vaniambady to Bangalore, say 70 miles (112.7 km) ; and
4. A Branch from No 2 at Coimbatore to the foot of the Neelgherry Hills, say 30 miles. (48.3 km)."

Thus the two schemes aggregated to a total mileage of 844 (1358.84 km), an ambitious programme, the chief motivation for which was the concern of the Madras Government and its Railway Construction Engineer for the rapid economic development of the Presidency and its people.

But Mr John Peter Grant, Home Secretary to the Government of India, differed. He argued that the trade from Bellary to Madras was estimated at Rs. 2½ lakhs annually but that from Cuddapah to Madras was Rs. 25 lakhs. The distance by road from Madras to Bellary via Cuddapah was 316 miles, but that via Bangalore would be 100 miles more. Cuddapah was 400 feet above the sea, Bellary 1600, Palmanair 2100 and Bangalore

3000 feet. It was, therefore, evident that a railway from Madras to Bellary via Bangalore would be 100 miles longer than by a direct road, would mount at least 500 feet only to fall again, while it would miss the entire (then existing) trade from Cuddapah, estimated 8 times greater than that from Bellary. Finally it was decided and the Government of India directed in a letter dated 4 March 1853 that a line from Madras as far as Menil be at once constructed.

The Madras Railway

The trunk line between the presidency towns of Madras and Bombay had been sanctioned by the Court of Directors in their Despatch No. 8 dated 17 April 1853. The railway on leaving Madras, advanced in a westerly direction, to Arkonam (42 miles (67.62 km) from Madras), the junction for the bombay line, and onwards to the military cantonments of Arcot and Vellore.

The railway was not taken close to the Arcot and Vellore towns, rather it was kept at a distance of three to four miles from them with the purpose of securing the easiest possible gradients. The line ran south to Jalarpet (Jaularapett), the junction of the Branch to Bangalore ; and then to the city of Salem, where, again bending westerly, it was carried on to Erode, the junction with the Great Southern Railway, running to Trichinopoly and Negapatam ; and so on to Coimbatore, and then following the course of the river Ponany, passed through a gap of the Western Ghats, called Palghat (Paulghat) to Beypore, 406 miles (653.66 km) distant from Madras and situated just below Calicut on the West Coast. It was hoped that a port might be formed at Beypore and a flourishing commercial town may spring up. In itself, however, it was of no importance ; and hence the sanguine hopes of those who selected Beypore as the terminus of the South-Western line were belied.

In the Eighth report of the Directors of the Madras Railway Company dated 20 February 1856, they stated as follows :

> "In the month of August 1845, the first portion of the Railway was as far completed as to admit of an excursion being made on it to the 37th mile by the Governor, the Commander-in-Chief, and other principal personages of Madras ; and on November 10, the Governor-General of India and his suite were carried by special train over nearly 60 miles of the line of that presidency, being Lord Dalhousie's first trip on an Indian Railway. On both occasions these high authorities were pleased to express their marked approbation of the works of the Railway and its progress, and of the accommodation provided for their conveyance.

"Considerable progress has also been made in the more distant parts of the line and the Chief Engineer has stated his expectation of having it ready the whole way to Salem, about 200 miles from Madras, by the middle of next year. Operations are at the same time proceeding actively on the Western side of the Peninsula, from Beypore inland to Coimbatore and are reported to be so far advanced at some points as to be ready to receive the rails. The first consignment of these and other permanent way materials to the port of Beypore arrived there in December last.

"The Terminal Station at Madras and the minor station buildings of the first seventy miles of the line were by last accounts sufficiently advanced to admit of the opening of that portion for traffic at an early date. Various causes had combined to prevent that event taking place quite so soon as was anticipated, and the 1st of next month has now been named as the day for opening. The Board have not been anxious to begin to work traffic till everything was well prepared for it and such a length of line ready as could be worked to a profit."

On 5 March 1856, the Directors sent the deed of contract entered into with the Madras Railway for the extension of the line to the Western Coast. According to a map accompanying the Madras Railway Company's ninth report dated 31 July 1856, the progress of railway construction was

"Madras-Arcot	: Constructed
Arcot-Beypore	: Under construction via Vaniambady
Vaniambady-Bangalore	: Line sanctioned."

An alternative line from Madras to Bellary was shown as via Cuddapah and Gooty. This report also mentioned : "......a wing of native Regiment with its followers was brought by train on 29 May 1856, 65 miles from Arcot to Madras before the public opening of the line."

In the thirteenth report dated 2 August 1858 the Directors of the Madras Railway Company expressed satisfaction that the line, 97 miles (156.17 km), from Madras to Gudiyattam then known as Goriattum, had been opened and traffic moving over it had registered a steady increase. It was one of the few reports on a railway company in the first decade of railway construction in India which presented such detailed statistics as average passenger and goods receipts in rupee per month and per mile open, and gross receipts and average of that per mile per month. These had improved from month to month and in the year ended December 1857, passenger, goods and gross receipts per mile were Rs. 182—13 annas, Rs. 137 — 4 annas — 7 pies and Rs. 414 — 9 annas — 10 pies respectively.

The Court of Directors' despatch No. 28, dated 18 August 1858 permitted the Madras Railway Company to proceed with the execution of the branch line to Bangalore. The line from Gudiyattam to Jalarpet was opened to traffic in 1960 and its further extension to Bangalore Cantonment four years later in 1864. By 1862, the line had reached as far as Renigunta, but it took nine years to meet the GIPR at Raichur.

South Indian Railway

This line, which was on the metre gauge throughout in 1880, originally consisted of several portions. The length from Nagappatinam (Negapatam) to Erode, 167 miles (268.87 km) was commenced in May 1859 by the Great Southern of India Railway, a guaranteed Company, and was completed on the 5' 6″ gauge. The portion from Ernakulam (Arconum) to Kanchipuram (Little Conjeveram) was commenced in March 1864 on 3 feet 6 inches gauge, and in January 1868 a contract at 3 per cent guarantee was granted to the Carnatic Railway Company for the extension to Cuddalore. In July 1874 the two undertakings were amalgamated, under the title of the South Indian Railway, and the whole system was operated on the metre gauge. Trichinopoly-Tuticorin length, 195 miles (313.95 km) was opened in 1875-76. The earthwork and bridges were made for a single way, except from Negapatam to Trichinopoly renamed Tiruchchirappalli, where the bridges were built for a double road.

Two short sections were added in 1880-81 ; Chingleput to Conjeveram 21 miles (33.81 km) and the Pondicherry Railway (from Villupuram to Pondicherry), 16.5 miles (26.56 km) ; this completed the South Indian Railway System, making the total length of 661 miles (1,064 km). This line was connected with the Madras Railway at Arconum, thus enabling traffic exchanged with that railway to be carried by a direct route instead of going round via Madras, a saving of 38 miles (61.18 km).

The South Indian Railway was the cheapest railway built in India, the cost per mile being £ 6,616 or Rs. 64,289.

Sind Punjab and Delhi Guaranteed Railway Company

This railway company registered in 1855, emerged from four separate undertakings which, under one management in London, had attempted to provide a combined steamship and railway route up the valley of the Indus from the port of Karachi. We are, however, more concerned with the activities of the Company in the area which, at one time, formed part of the land of the five rivers, namely the territories of Punjab, Haryana and Himachal Pradesh and to some extent the province of Punjab now in Pakistan.

It is interesting to note in this context that the very first railway line which was laid in this territory now transcends the present day political boundaries and its two parts lie in India and Pakistan. The section between Lahore and Amritsar was built in 1861 and was opened to traffic on 10 April 1862. As one talks of political boundaries between sovereign states, one has to be meticulous about distances and mileages. The distance by rail between Amritsar and Atari, the last railway station on India's boundary with Pakistan, is 26 kilometres and that from Atari to the boundary another kilometre, making a total of 27 kilometres within Indian territory.

The line from Atari to Ambala Cantt was built progressively during the following eight years between 1862 and 1870. The phasing of the construction did not obey the law of continuity. While the section between Ambala Cantt and Ludhiana had been opened on 12 October 1869, and that between Jullundur Cantt and Beas on 15 November 1869, the gap between Ludhiana and Jullundur Cantt was not filled up till a year later.

The plans of the East Indian Railway Company were that Lahore, instead of Delhi, should be the terminus of that line and some reconnoitering had been done of the best place for a crossing of the river Sutlej, but it was decided by the Government of India that the EIR should not be entrusted with the extension of its Howrah-Delhi line beyond Delhi.

By 1868, the Sind, Punjab and Delhi Railway Company had built 253 miles (407.33 km) in the Punjab. The portion from Ghaziabad to Amritsar, 304 miles (489.44 km), was commenced early in 1864 ; and in May 1865 Messrs Brassey and Company, who also built some other railway lines in Bengal presidency, entered into a contract for the construction of the line in five years. This period was subsequently extended to six years, owing to the magnitude and large additions made to the original design of the Sutlej-bridge. The first length to Meerut City, 27½ miles (44.27 km), was opened in April 1867, and in November of the same year 26 miles(41.86 km) was opened from the Beas river to Amritsar. Uninterrupted communication between Lahore and Delhi via Ghaziabad was established by the completion of the Sutlej bridge in November 1869. From Amritsar to Beas the earthwork was made for a double road ; that of the remaining distance to Ghaziabad was for a single line.

Calcutta and South-Eastern Railway

After the initial success of the East Indian and the Great Indian Peninsula Railways, which had expanded fast and were earning enough to pay the 5 per cent interest, so great was the euphoria in the capital market

of London for rail-building in India that investors entertained large schemes, in some instances quite wild and impractical. One such scheme was floated by the promoters of the South-Eastern Railway who wanted to build railways through the Sunderbuns from Calcutta to Chitagong.

The port of Haldia was developed in the third quarter of the twentieth century, but the search for an alternative to Calcutta had begun more than a hundred years earlier. The merchants of Calcutta found in the middle of the nineteeth century, the navigation of Hooghly so long, tortuous and dangerous, that some means of forming a subsidiary port had become a matter of urgency.

In their despatch No 31 of 8 October 1856, the Court of Directors of the East India Company intimated to Governor-General-in-Council that the Calcutta and South Eastern Railway Company intended to build a line from "Calcutta to the Mutlah River and thence to Chittagong and Arracan", and had appointed Mr James Songridge as Chief Engineer and directed him to proceed to Calcutta. The applicants (the Company) had "embarked on a new principle.. ... to develop the resources of the country without the aid of a Government guarantee."

After an unsuccessful attempt to obtain capital without a guarantee, the promoters were obliged to apply to the government for assistance. The Government of India did not view their ambitious project favourably, and wrote accordingly to the Court of Directors of the East India Company. The Secretary of State, however, agreed to concede a guarantee of 5 per cent for a section of the line from Calcutta to the port on the Mutlah, but declined to include any other portion in the Sunderbuns.

The contract between the Calcutta & South Eastern Railway Company and the Secretary of State for India was signed on 15 March 1859. The Company decided not to follow the usual method of contracting out the work, but preferred to have it done by its own engineers. The distance from Calcutta to Mutlah was about 30 miles and the country was dead flat. The Mutlah, though often called a river, was really an arm of the sea, but far less liable to change and silting than the Hooghly. This creek, therefore, presented to the Company certain advantages as compared to the discharge mouth of the Ganges at Calcutta.

The only work of importance on the line was a bridge over the Piallee, which gave far more trouble and cost much more than had been anticipated. A prolonged struggle with well-sinking and abutments in the soft yielding soil, which seemed to swallow up all that was thrown into it, made the work very tedius and time-consuming. The line was eventually opened in 1862, but the revenue was meagre and the working expenses high, so much so that in 1866, this was the only railway company in India which was not making profits. With a further heavy loss from the sinking

of a jetty at Canning, the Campany was forced to withdraw from the undertaking and offered to hand it over to Government in terms of the agreement. The Government accepted the offer in 1868. The South-Eastern Railway thus earned the distinction of being the first government-owned and government-managed railway in India.

Eastern Bengal Railway

For the promoters of the Eastern Bengal Railway Company, one Mr W. H. Ferguson mooted a proposal in 1856 for the construction of a railway from Calcutta to Dacca and requested the Hon'ble Court of Directors of the East India Company to sanction for the purpose of survey and preliminary expenses an expenditure of 5,000 sterling.

The Company was floated with a capital of 100 lakh rupees or 1,000,000 pounds in 50,000 shares of Rs. 200 or £ 20 each. It is interesting that the company provided for the stock to be held by shareholders in India in Indian currency. The object of this Company was to establish railway communications throughout the delta of the Ganga, a tract of country more fertile and populous than any other in India.

The proposed line was shown on a map, leaving Calcutta, touching Dum Dum, passing through Bangaon and Jessore, crossing the Ganges by means of ferry at Hajigunge and bifurcating at a place called Churan, into a northern spur going to Dacca and a southern spur going to Narainganj (Narayanganje).

The first meeting of the Company was held on 6 August 1858 in London when it was decided to construct the first line of 108 miles from Calcutta to Kushtia(Kooshtee), "passing through the important military station of Barrackpore about 16 miles from Calcutta and through some of the richest agricultural and most densely populated districts of the delta of the Ganges in Lower Bengal, the place, order and industries of which have not, the Directors are happy to say, been in any way interrupted by the late mutiny and revolt."

But the first war of independence had certainly damped the enthusiasm of the investors in London, as will be seen from a despatch received in January 1858 from the Honourable Court of Directors intimating "that on the representation from the Directors of the Eastern Bengal Railway Company of the probability that a call would not in the then existing conditions of India, be responded to, they have been pleased to consent to the postponement for 3 months of the first call upon the Capital. A similar concession has, for a like reason, also been granted to the Directors of the Calcutta and South Eastern Railway Company."

The Company was incorporated and appointed I. K. Brunel as its Consulting Engineer. The Railway ran from its Sealdah terminus in

Calcutta, northwards along the east bank of the Hooghly, then to Kushtia on the Ganga and onwards to Goalandu. Sealdah to Kushtia was completed in November 1862 and Kushtia to Goalandu was opened in January 1871. Both these stations, Kushtia and Goalandu are now in Bangladesh.

Steamers belonging to the Railway company linked the riverside railheads such as Narainganj with Dacca, Assam and elsewhere. The Company had a sizable flotilla and in this sense was the only railway line in India which had a respectable Steamboat Department. The following excerpt from the Railway's Progress and Administration Report for 1880-81 highlights the importance of this activity :

> "Steamboat Department. The steamer Princess ALICE had her engines compounded and supplied with new boilers. The improvement to her engines and new boilers, have given very satisfactory results. She now saves 9 cwt of coal per hour. Her engine-room crew has been reduced by 10 men. She has 1,500 maunds more carrying space and her speed and towing power have considerably increased.
>
> The despatch steamers "LUKHIA" and "SOORMA," for which the iron work and machinery were received during the year, have been put together. The former was launched on September 21 and the latter on October 20.
>
> The engines of the PRINCE ALFRED and the boiler of the ROB ROY were under repairs at the close of the year, and the engines of the PRINCE OF WALES were about to be taken in hand."

Before the partition of the country in 1947, there was a regular overnight service from Calcutta to Gaolandu by train, from Gaolandu to Narainganj, about eight hours by steamer, and the last lap of about an hour by train to Dacca.

The Diamond Harbour branch was commenced in the year 1862 when the first 10 miles was built from Belliaghat to Sonarpur. There was no progress on this branch for the next twenty years, but in 1882-83, the rest of the line was completed at a fast pace.

Oudh and Rohilkhand Railway

After the experience of the guaranteed railways built in the first decade of the construction of railways in India, Government made efforts to have railways built on less generous terms. In 1862, subsidies over a 20 year term, but not guarantees, were granted to the Indian Branch Railway Company, which had promised to build some branch lines in North

India, namely Kanpur-Lucknow and Lucknow-Mughalsarai. But the company could not attract sufficient capital. It had, therefore, to approach the Government to grant it a guarantee, which was done at 5 per cent. The company changed its name to the Oudh and Rohilkhand Railway to better reflect its purpose.

Construction commenced in January 1864 and a length of 42 miles from Lucknow in the direction of Kanpur (Cawnpore) was opened in April 1867. The bridge at Kanpur and the junction with the East Indian Railway at the station were completed in July 1875. Originally the O & R took land for double line, but the formation was built for a single line. Between Lucknow and Nawabganj, however, the masonry of the bridges was constructed for a double track.

Indian Midland Railway

The Indian Midland was a guaranteed company, which connected the G. I. P. Railway with Jhansi, Agra and Delhi. It extended from Bhopal to Delhi, and from Jhansi to Kanpur and included the branches to Manikpur, Katni-Murwara, Kota and Ujjain. It was an extensive system and as the name denoted, it spread a network of railway lines in the midland of the Indian subcontinent. It was one of those companies, along with the Bengal-Nagpur and the Southern Mahratta, which was given a guarantee of interest based on the new terms, known as the modified guarantee system. The rate of interest was 4 per cent, instead of 5 per cent as in the first guaranteed system, under which the East India and the Great Indian Peninsula Railway Companies were floated.

The Company entered into a contract with the Secretary of State on 2 October 1885, for the construction of certain lines, including the projects for the Bhopal-Jhansi-Kanpur, the Jhansi-Gwalior and Jhansi-Manikpur sections. This company opened from Dholpur to Agra on 10 January 1878, and on 1 January 1889 the main trunk line from Itarsi to Agra, the connection with the Great Indian Peninsula Railway at Itarsi having been made on 1 November 1884. The Indian Midland Railway comprised 677 miles (1090 km) of standard gauge lines, the main trunk route 314 miles (505.54 km) extending from Bhopal to Agra via Jhansi, a branch 180 miles (280 km) extending from Jhansi to Manikpur, another branch also taking off from Jhansi 135 miles (217.35 km) and going northwards to Kanpur, and a short branch 46 miles (74 km) long from Bina to Saugor. The Bhopal-Itarsi State line, embracing several projects initiated and partly or entirely constructed by the Bhopal State, and worked under agreement by the Great Indian Peninsula Railway Company, was taken over and worked under

contract by the Indian Midland Railway Company with effect from 1 January 1889. The company was merged with the GIP Railway in 1900.

Southern Mahratta Railway

In the eighties, company lines were being built along with the state lines, that is lines constructed and managed by the Government. It was hoped that lines which appeared likely to be remunerative would be taken up by private companies, either without a guarantee or on a guarantee for a limited period.

It was in these circumstances that the Southern Mahratta Railway Company was formed as a famine line. A guarantee of 4 per cent on the capital was given for seven years, and 3½ per cent subsequently in 1882, together with a ¼th share to the company on net profits. An important aspect of the arrangement between the Government and the company was that the line was declared to be the property of the State from its very inception.

The Southern Mahratta Railway developed into a metre guage system of more than 1600 miles (2576 km) by the year 1900. Its north-south main line stretched between Pune (Poona) and Bangalore and Mysore, while another main line spanned Southern India from Vijayawada (Bezwada) on the east coast to Goa on the west, although in Goa its role was that of managing the West of India Portugese Railway.

The main line from the frontier with Goa territory to Vijayawada (Bezwada), 513 miles (826 km) was built by stages from 1884 to 1890, the first section opened to traffic being the 40½ miles length, between Hospet and Bellary, on 24 March 1884. The Bellary-Guntakul section, 30 miles, had been opened in 1871 as a broad gauge branch of the Madras Railway and was made over to the Southern Mahratta Railway on 1 February 1887 and converted to metre guage on 16 May 1887. The north-south connection between Poona and Londa, 277 miles (446 km), took four years to complete from November 1886 (Koregaon-Ghorpuri, 83 miles) to October 1890 (Ghorpuri-Poona, 91 miles). Londa-Koregaon section was opened by stages during 1887.

Bengal Nagpur Railway

The Bengal Nagpur Railway Company was formed on conditions similar to the Southern Mahratta Company, but with Government offering a permanent guarantee of 4 per cent, and ¼th of the surplus profits. This arrangement was in essence a reversion to the policy of Lord Dalhousie,

the main difference being that the rate of interest was lower,that is 4 instead of 5 per cent, and the major share of profits over the guaranteed figures was to be taken by Government. Another important difference was that the line was held to be state property from the very beginning.

The beginning of the Bengal Nagpur Railway was made with the construction of a metre gauge line from Nagpur, where it made a junction with the Great Indian Peninsula Railway, to Raj-Nandgaon (Raj-Nandgaon), a distance of 144 miles (231.84 km), which was converted to broad gauge and reopened on 27 November 1888.

Meanwhile, construction had been going on between Bilaspur and Raipur, a distance of 69 miles, which was opened to traffic in 1881. The missing link between Raipur and Rajnandgaon had to wait until the completion of the conversion work on Rajnandgaon-Nagpur section and was opened in December 1888. Progress was quite fast after that and during the next three years, the line was extended eastwards to Raigarh, Jharsuguda, Chakradharpur, Purulia and Asansol, where it made a junction with the East Indian Railway, thus providing a shorter route between Bombay and Howrah, as compared to the one via Allahabad.

An interesting side light on the BNR is provided by the observation made by the author of a travel book *India of the Queen* : "The chances of a god doing a large and increasing business are greatly improved by a railway station; Juggernaut himself, after defying the calumnies of a century, now finds his popularity imperilled for want of a railway communication." In 1897, the BNR built the 27 mile (43.47 km) Khurda Road-Puri branch and thus placed Lord Jagannath on the railway network.

4

Early Railway Construction and its Problems

The construction of railways in India in the early stages had to encounter many problems. The terrain was not difficult, except for the Western Ghats. Elsewhere, during the first 15 years, the ruling gradient met was no steeper than 1 in 100. The difficulties that the early builders faced arose from import of stores and personnel, excessive heat, territorial disputes, hazardous transport, political disturbances, failure of contractors and red tape.

Though the Court of Directors, in a despatch issued in 1854, directed that indents to England should be confined to articles which could not be obtained in India, most of the equipment and materials, the rolling stock, the girders, the rails and even the sleepers had to be imported, because they were either not available in India or the quality was not satisfactory.

Import of Stores

Plans had to be made months in advance to work out the quantities and specifications of rails, ties, sleepers, signals, locomotives, passenger coaches, goods wagons and many other inputs, orders placed for their manufacture with factories in England, shipment schedules arranged with ocean lines—all to meet certain targets for opening the lines as fixed by the company boards of directors located in a distant land.

Vigil on the procurement, despatch and receipt of stores and materials was maintained at both ends, by the home boards of the railway companies

in England and by their Agents in India. The eighth report of the Directors of the Madras Railway Company to the shareholders laid emphasis on this aspect :

> "The shipment of materials and stores of all descriptions for the Railway from the country has been carried on to a great extent during the past year, having reached a total of 34,500 tons, principally dead weight, despatched within the twelve months ; an amount somewhat remarkable to be attained without material enhancement of the current rates of freight, considering previous to the commencement of the Company's shipments, the total amount of tonnage which arrived at Madras from England averaged little more than 28,000 tons per annum. The effect of a large supply of materials from this country being thus placed at hand in advance is to remove, it is hoped, all risk of the progress of the works being hindered for want of them in future."

There is some evidence to show that Indian woods were tried for sleepers in March 1853. We find the Consulting Engineer to the Government of India asking the Chief Engineer, East Indian Railway for a report on his experiments with creosoting Indian woods. Again, it was appreciated that iron of good quality was being produced in India, but not in such quantities as to meet the requirements of railway construction.

After the first 38 miles (61.18 km) of the East Indian Railway had been laid from Howrah to Pundooah, the first train could not run for a whole year. The ship bringing the first models of railway carriages *HMS Goodwin* sank at Sandheads. The first locomotive meant for the line was misdirected to Australia. Mr. John Hodgson, the East Indian Railway's Locomotive Chief Engineer, finding that the carriage models had been lost, set about building carriages locally. This was done by two Calcutta coach-building firms of Messrs Steward and Company and Seton and Company. The locomotive reached Calcutta via Australia by HMS *Dekagree* in 1854 and soon afterwards on 28 June was taken on a trial trip by Mr Hodgson from Howrah to Pundooah. The railway was opened as for as Hooghly, a distance of 24 miles (38.64 km), on 15 August and up to Pundooah on 1 September 1854.

Personnel

The early builders, engineers, supervisors, traffic managers and locomotive superintendents all came from Great Britain. They were highly paid men, at double the rates they would have received in their own country plus generous allowances. For instance a Resident Engineer would receive a salary of Rs. 600 per month plus a horse allowance of Rs. 105. The

artisans, carpenters and ironsmiths, station masters, pointsmen and gangmen were locally recruited. A station master was paid Rs. 25 a month and a pointsman about half that sum. The wages of masons and carpenters were similar, 10 to 15 rupees a month.

Excessive heat, humidity and mosquitoes claimed many victims. Typical is the case of F. W. Simms, the first Consulting Engineer for Railways to Government of India. In 1850, he was ordered by the Governor-General to proceed to Madras or Bombay to gain first hand knowledge for the information of the Government about the proposals for the construction of lines which had emanated from the two Presidencies. Simms forwarded a medical certificate testifying to his inability to undertake any duty involving exposure to the sun or continued mental exertion. He was the subject of voluminous correspondence between the Governor-General, Court of Directors and the Agent, East Indian Railway. Ultimately, Simms left India in the spring of 1850.

The turnover of expatriate staff described by Westwood as "hard working, hard-drinking and reckless, was high, death and incapacitating sickness, alone removing five per cent of them every year."[1] Lord Dalhousie displayed great concern over this situation when he went on record in 1853 that a line from Bombay to Hindustan should be speedily constructed to shorten the period of journey of recruits arriving from England, having to report at Calcutta prior to joining duty at inland locations and the repatriates in poor health having to follow the same route on the return homeward journey. In the circumstances, it was not surprising that at one stage the Consulting Engineer stated that his views respecting the employment of educated youngmen either born in India or inured to the climate, in the Engineering Department of the Railway had the concurrence of the Governor General-in-Council and would be recommended to the Court of Directors. But the proposition was not seriously pursued.

Territorial Disputes

Another reason for the work being held up was territorial disputes. On the EIR, a section of the line passed through the French Territory of Chandernagore. The Consulting Engineer to Government recommended in April 1853 a temporary settlement with the French authorities for the completion of the direct Chandernagore line, so that in the event of an adverse decision being received from Europe on the question of this straight line its occupation by the Railway Company should terminate twelve months after the arrival of such a decision. Six weeks later, the Consulting Engineer, having learnt demi-officially from the Foreign Department that the land required for the original direct course of the Railway near

Chandernagore had been ceded by the French Government, instructed the Railway Agent to resume work on the portion of the line between Chanderanagore and Howrah.

Hazards of Transport

India was not exactly infested with wild animals in the middle years of the nineteenth century, but tigers and elephants were a hazard that the pioneers had to contend with. The E.I.R's Main Line from Burdwan to Patna, according to J. N. Westwood, passed through desolate and hilly country with a troublesome tiger population, Elephants were in the habit of uprooting telegraph poles and rings of iron spikes had to be fitted round them as a protection.[2]

The Company's engineers were exposed to danger from these animals as they had to move about on horseback for supervision of construction work. Incidently, as early as 1851, we find a letter from the Consulting Engineer sanctioning a horse allowance of Rs. 30 per month to an Assistant Engineer and an Inspector of Works. A couple of years later, we find him recommending a horse allowance of Rs. 105 per month for the Resident Engineer, Howrah and Chandernagore.

The main supply routes of imported equipment and materials were through the ports, but many sections were built inland, which had no continuous rail connection with the ports. The means used for transport were, therefore, country carts and river boats, which were both slow and costly. It was EIR's experience that boats ran aground in the Ganga and work was often held up. The railway had eventually to acquire its own fleet to transport ironwork.

Political Disturbances

The English companies, who were given the contracts for building the first lines, their engineers who were foreigners in India, and their sub-contractors did not encounter any serious political opposition. A few incidents took place in 1857 when there was an uprising in Northern India. There was an attack on the Son bridge while it was under construction and the engineers defended it from the bridge works which served as fortification. The works suffered serious damage and retarded the advance of the line.

The construction companies now and then found themselves involved in legal wranglings over the acquisition of land for laying the tracks. A Gosain at Serampore threatened legal proceedings for unauthorised entry

of his land by the Railway people aided by the Magistrate of Hooghly, Mr Bells.

The foreign companies were, however, not oblivious to the help they were able to obtain from local people, which enabled them to push on their work. The Agent, East Indian Railway Company, wrote to the Court of Directors in November 1850 that "he proposed to erect a memorial on one of the bridges or other buildings of the Railway Company in honour of those public spirited zamindars who may come forward and give up without charge any portion of their lands that may be required for the Railway."

Contracts and Contractors

To achieve targets, the Government of India, the Presidency administrations and the Agents of the railway companies watched the work of the contractors with a hawk's eye and gave them no quarter for delay or tardiness. In a despatch dated 5 February 1870, the Government of India, Fort William, Calcutta, wrote to the Secretary of States for India, London : "Referring to the Despatch from the Government of Bombay, No. 3, dated the 17 January 1870, regarding the unsatisfactory progress of the works on the unopen line of the Great Indian Peninsula Railway between Sholapoor and Raichore, we desire to give our full support to the opinion of that Government that energetic measures are called for in respect of the works on the section so unfavourably reported on. The Consulting Engineer has recorded that there is no difficulty in completing all the works, with the exception of the Krishna Bridge, by 30th of June, the date to which Mr Bray's time of completion has been at his own request extended, and the date by which Mr Bray's agent personally admits that the work can be finished if pushed on with vigour. No further consideration, therefore, can be due to the contractor, and if the works are not finished by that date, we agree that they should, as directed by the Government of Bombay, be taken out of the contractor's hands and finished at his expense by the Company's officers. It is manifestly of the highest public importance to accomplish the opening of the Railway between Bombay and Madras at the earliest possible date, and we trust that all that is possible may be done to strengthen the Government of Bombay in its endeavours to effect this."

There were three patterns of execution in the early stages of railway construction in India. The first was that of entrusting small sections of the line to local contractors. The East Indian Railway followed this method in the hope that small local contractors would be able to cope better with Indian conditions. The Great Indian Peninsula and the Eastern

Bengal Railway chose to give large contracts to well-established English firms. While that was the second pattern, the Madras Railway adopted a third and an entirely different pattern, which kept contractors out and entrusted the work to the company's own engineers. Of these three patterns, the second adopted by GIPR and the EBR produced the best results. Many of the E.I.R. contractors found their tasks beyond their financial means and managerial skill. So they fell heavily behind schedule. Attempts to goad them to better performance by withholding cash advances only led to a worsening of the situation and in the end E.I.R.'s own engineers had to take over many sections.

Burning of Bricks

The burning of bricks was one of the early occupations of the railway engineers in India, particularly in those parts where stone was not available. As the bricks available in the market were not always of good quality, the engineers organised their own brick works. In December 1857, there was exchange of lengthy correspondence on the subject of coal for brick-burning for construction in Beerbhom district (E.I.R.) among the Agent EIR (Edward Palmer), Chief Engineer, EIR (George Turnbull), Consulting Engineer to Government of India (Major G.G. Goodwyn) and Engineer-in-charge of construction (M. James Perry) at Rampore, about the repeated delay in the supply of coal, different sources of supply, prices, etc. On 16 December 1857, Perry wrote to Turnbull from Rampore : "......it would be very desirable if we could get any (coal) from Raneegunj, even if it were to cost 8 annas per maund as it would be cheaper than paying 6 annas for the coal we are now getting, a great deal of which is very bad and takes 1,000 maunds to burn a lac, whereas about 600 maunds of the Raneegunj coal would do and at the same time burn much quicker."

In their Despatch No. 50 dated 16 May 1860, the Court of Directors pointed out to the Governor-General-in-Council that the East Indian Railway Company had reported that the progress of the bridge over the Jamuna at Allahabad had been impeded by the want of land for brick making......and "I wish to draw your attention to the subject that you may be satisfied that no unnecessary delay in the execution of this important work is permitted by the local authorities."

On the Sindia-Neemuch Railway, progress was slowed down owing to earth suitable for brick-burning not being available anywhere along the line from Neemuch to Mhow. As stone was also not to be found except in one or two places and masonry was expensive the cost of line went high, Rs. 87,500 per mile.

Red Tape

Concentration of authority at the higher levels of the administration was a feature of the Indian Railways from the very beginning. There was too much writing up and down to seek sanction for small matters and expenditure of a routine nature. For instance, the Chief Locomotive Superintendent of the East India Railway submitted on 9 January 1858 the following indent for coal to the Government of India, headquartered at Fort William in Calcutta :

Indent for coal on Sear Sole colliery submitted by Chief Locomotive Superintendent :

Maunds	*Seers*	*Chhataanks*		Rs.	Ana	Pie
21,260	18	3	at 3 annas per maund Company Rupees.	3,986	5	4

Sanction was given by Under Secretary to Government of India on 12 January 1859. Fortnightly bills of contractors had to be prepared by the Resident Engineers, routed through the Agents and submitted to the Government of India for sanction.

Progress of construction was held up frequently in following the formalities connected with acquisition of land. When preparation had well advanced to begin work on the construction of the experimental line of the East India Railway from Howrah to Pandooah, the Railway Commissioner wrote to the Chief Engineer of the EIR on 23 October 1850, "I am sorry to say that until the new Act passes I am unable to give you any authority to commence clearing away the jungle and opening out a path for the purpose of making the centre of the line......"

On another occasion, Mr Turnbull, Chief Engineer, EIR, a very capable officer, who was highly complimented by his superiors, was issued a caution by the Government of India for some additional outlay on the completion of Burdwan Station beyond the sanctioned amount. Minor losses are but natural in an undertaking constantly at work, but these have always generated bulky correspondence on the Indian Railways, resulting in much wastage of time and energy. This was so a hundred years ago and so it is today.

In connection with a loss of Rs. 1590-10 annas 10 pies incurred by the Punjab Railway on a purchase of deodar timber from the Canal Workshop at Madhupur, protracted correspondence, extending over 3,000 words was exchanged in 1869 and 1870, among the Government of India, Secretary of State for India, Government of Punjab, Agent Punjab and Delhi Railway, and Board of Directors, Punjab and Delhi Railway,

London. The volume of correspondence at the lower levels, that is, among the Canal Department, Public Works Department, Conservator of Forests Punjab, Railway Company's Accountant and Storekeeper and other officials must have been several times over.

The circumstances under which this loss occurred in April 1863 were that the Punjab and Delhi Railway Company purchased timber at Madhopur to the amount of Rs. 6,936. During that year, timber to the value of Rs. 5,344-5-2 was floated down the river Ravi and received in the store. The remainder was never received, and the explanation given by the Agent of the manner of the loss was found unsatisfactory. It appeared that the matter was overlooked or neglected after a few unsuccessful attempts had been made to recover the timber.

The Government of India wanted the amount of the loss to be excluded from the capital account of the Railway, but the Agent did not agree and appealed to the Company's Board in London. Hence this lengthy and infructuous correspondence. A cry of unnecessary delay, of minute interference and obstruction was atonce raised, and both sides felt aggrieved.

There was much wrangling over the approval to the design of new works. Engineers were aggrieved at their designs not being sanctioned as submitted and the administrators at being asked to sign approval on papers and plans so prepared that a due professional judgement could not be safely passed. In fact railway officials disliked at first giving such full and detailed designs and estimates as would admit of a real opinion being formed on the proposals, being afraid, of being exposed to unfair criticism by men for whose professional competence they at least had no high respect. And Consulting Engineers, feeling that they were being pressed to decide very important points, involving large outlay and much responsibility on imperfect information, were constrained to hesitate. If a reference to Government was made, serious delay was certain, and the result usually was that the additional information required was called for authoritatively and was submitted, and after much delay and some heart-burning, a design, somewhat modified, was at last accepted to save time, though probably it was not necessarily the best design.

There were many more instances of the progress of the construction of lines being slowed down by red tape so much so that at one stage in 1854, the Home Department of the Government of India had to write to the Consulting Engineer that he could assure the Court of Directors that "they may safely lay aside all their apprehensions that the interference of the officers of government in railway works is calculated to deter contractors or to delay progress, or in any other way to act injuriously upon the undertaking which they superintend".

A Parliamentary Select Committee

All this was vexatious and annoying to both sides, indeed to such a great extent that influential members of the House of Commons, some of them Indian railway directors, obtained in 1857-58, a Select Committee to enquire into the causes of the delay which had occurred in the construction of railways in India. The Committee reported that time consuming correspondence was one of the reasons for delays in constructing Indian railways, others being friction among engineers, the distance over which materials had to be hauled and failures of contractors. The Committee recommended a less bureaucratic approach. This, however, did not put an end to what was described as interference by government officers. They had their function as guardians of the public interest and to ensure that in view of the government having been committed to a 5 per cent guarantee, money was well spent and there was no waste. Engineers in the field had to submit plans to higher authorities for approval and there were frequent back references, not a few relating to expenditure, just as no surveys of new lines could be undertaken in India without the sanction of the Court of Directors in London.

Many officers were inclined to be overbearing in their attitude towards their subordinates, particularly the Consulting Engineers at the Headquarters of the Government of India when they wrote to the Agents of the railway companies or the Presidency Governments. At one time the Secretary of State for India took notice of this tendency and that was followed by some far from cordial correspondence between him and the Governor-General. The matter was finally set at rest by the issue of a conciliatory despatch from India Office to Fort William.

In spite of these numerous difficulties, which slowed down the pace of construction, the early builders were so keen to push ahead with the surveys and straightaway embarked on laying the tracks. According to Edward Davidson, "In January 1851, out of the first 40 miles from Calcutta to Pundooah, there remained but 5 or 6 miles of jungle and trees to clear, while 15 miles had been surveyed, and a length of 10 miles of section completed."[3] The formality of completing the survey was, at this stage, dispensed with, and tenders were invited for the construction of the line from Calcutta to Pundooah. Shortly afterwards, the Court of Directors, on the recommendation of Lord Dalhousie decided that the Railway should be carried onwards from Pundooah to Raneegunge. Such expediency at times led to interesting ventures. The first iron bridge erected by a railway company in India was the one over the Mugra Khall on this section. It consisted of three spans of four Warren's girders. There were two girders for each line, and in 1858 one set of girders rested on wooden and the other on brick piers. The length of the girders was 85 ft and their depth 6 ft 3 ins.

A major problem that the Indian Railways had to contend with soon after the first lines had been built was that of the width of the track. While most of the lines built on the Old Guarantee System upto 1868, escaped this question, it became a live issue immediately after that year, as the Government took the decision to build railway lines at state expense. As this is a problem of vast magnitude, it deserves a chapter by itself.

NOTES AND REFERENCES

1. Railways of India : J. N. Westwood ; London, 1974.
2. Ibid.
3. Railways of India : Davidson.

5

The Battle of the Gauges

The Indian Railways were beset with the gauge problem in their infancy. In 1851, Lord Dalhousie had written : "The British Legislature fell into mischievous error permitting the introduction of two gauges in the United Kingdom... The Government of India has the power, and no doubt will carefully provide that, however, widely the railway system may be extended in this Empire in the time to come, these great evils should be averted."

But as fate would have it, the evil of multiple gauge could not be averted in India. There were certain compulsions : the limitation of funds, insufficient traffic and strategic considerations. But it is a curious fact of history that such factors did not ultimately play any part in the adoption of the standard gauge, 4 feet 8½ inches, in Great Britain, the fountain head of the railway knowhow for India.

The Practice in Britain

The gauge adopted for trunk lines of railway in Great Britain, on the continent of Europe (except Russia), and in America was 4′ 8½″. Probably no careful consideration was given to this actual dimension when it was selected as the gauge of the wheels of the first locomotive ever made, but it happened to be the gauge of the tramways used in the district where George Stephenson made his first locomotive. After very careful consideration by a Royal Commission, a gauge of 5′ 3″ was adopted as the standard for Irish Railways.

In their despatch dated 14 November 1849, the Court of Directors of the East India Company, observed : "With respect to the weight of rails

and gauge of line to be employed on these railways, we are disposed to recommend those used by the North-Western Company here, namely a gauge of 4′ 8½″ and a weight of 84 lbs to the yard, as combining the greatest utility and economy." At that time Lord Dalhousie was the Governor-General, and Mr W. Simms, C. E., the Consulting Engineer to the Government of India for Railways.

Mr Simms recorded his reasons for recommending a wider gauge than 4′ 8½″ as follows :

> "The wider gauge of 5 feet 6 inches, which I would recommend for adoption, will give 9½″ more space for the arrangement of several parts of the working gear of the locomotive engines; and this additional space will be more needed in India than in Europe, not only on account of the machinery itself, but it would also lower the centre of gravity of both engines and carriages, the result of which would be to lessen their lateral oscillation, and render the motion more easy, pleasant, and at the same time diminish the wear and tear.
>
> "The lowering of the centre of gravity, consequent on the adoption of the wider gauge appears to me of great importance for another reason, namely, the fearful storms of wind so frequent at certain seasons of the year, and I think it very probable that in one severe norwester, not to mention such hurricanes as that of 1842, the additional 9½″ of width might make all the difference between the safety and destruction of the trains, and one such accident attended, as it doubtless would be with great loss of life, would probably retard the progress of the railway system in this country considerably."

Lord Dalhousie's Views

The following excerpts from Lord Dalhousie's Minute, recorded in 1850, deal with the question of gauge :

> "The Court of Directors have recommended at the same time the use of the narrow gauge of 4 fts 8½ inches for the railway about to be constructed, although the letter of the Court recommends, but leaves to the Government of India, to determine as to the gauge which should be adopted on this occasion, I consider the question to be one of such moment as to deserve a careful consideration and an authoritative and conclusive decision by the highest authority connected with the Indian Empire, who alone can have access to that full information and extended experience which would make such a decision really and satisfactorily conclusive. "The Government of India has it in its power, and no doubt will carefully provide, that uniformity

of gauge should be rigidly enforced from the first. But I conceive that the Government should do more than this; and that now, at the very outset of railway works, it should not only determine that any uniform gauge shall be established in India, but that such uniform gauge shall be the one which science and experience may unite in selecting as the best. At one time this question was much before me; and although I should not myself attempt to offer an opinion on so vexed a question, yet I may venture to form one on the recorded views of the men competent in every way to judge... The evidence which was given before the Gauge Commissioners in 1846 and the evidence which was given from time to time before the Committees of Parliament, backed as it has been by very high authority, already is, I venture to think, sufficient to show, that the narrow gauge of 4′ 8½″ (a measurement adopted originally at haphazard and from the accident of local circumstances) is *not* the best gauge for the general purpose of a railway, and that something intermediate between the narrow gauge of 4′ 8½″ and the broad gauge of 7 feet will give greater advantages than belong to the former, and will substantially command all the benefits which are secured by the latter......

"The circumstances which have been brought forward by Mr Simms in his report, applicable especially to this country, strengthen the reluctance which I feel to introduce the 4 ft 8½ inches gauge into India without a very deliberate reconsideration of the question, with reference to India, under the direction of the Hon'ble Court by the Board of the East Indian Railway Company, I should not have felt satisfied that I had done my duty, if I had not brought this question pointedly under the consideration of the Court, requesting them formally and finally to determine whether a wider gauge than 4 feet 8½ inches ought not to be established in India; and whether the gauge of six feet which was recommended by engineers of eminence in England, should not be introduced on the experimental line in Bengal, and at the same time on the line which is in course of construction at Bombay."

Lord Dalhousie and many others, who made a contribution to the question of gauge in India in the middle of the nineteenth century used the expression "narrow gauge" in a loose manner. The metre gauge, 3 feet 3 3/8 inches had not yet emerged as a definite choice : so any width of gauge less than 5′ 6″ was termed as narrow gauge.

Broad Gauge Adopted

In reply to this despatch the Court of Directors were 'disposed to

think' a gauge of 5′ 6″ was the most suitable, and communicated that decision to the several Indian Railway Boards in London. This decision did not coincide with the views of the authorities : and Major J. Pitt Kennedy, who succeeded Mr. W. Simms as Consulting Engineer for Railways, suggested that further reference to the Court of Directors might be made. To this Lord Dalhousie assented. A reference was made to the Court for a reconsideration of their earlier decision prescribing a gauge of 5 ft 6 inches for railways in India, but the recommendation to increase the gauge to 6′ was not assented to, the Court of Directors saying that their decision had been "arrived at after a very careful consideration of the subject, and with the best opinions that we could obtain. That decision having been communicated to the Railway Companies who have entered into contracts for the execution of works, and for the provision of materials on the presumption that it is final, it would lead to much inconvenience and expense if the alterations were now permitted."

This decision was accepted by the Government of India, and the 5′ 6″, gauge was adopted as the standard gauge for the trunk lines in British India. The question of gauge, however, again came to the fore when the Indian Branch Railway Company, later known as the Oudh and Rohilkhand Railway Company offered to build light railways in India. The original projector of this Company was Mr. J.E. Wilson ; and it was his intention to lay light lines of railway on existing roads, but on a gauge narrower than that of the trunk lines so that they act as feeders to the trunk lines. This idea, at that time, seemed to be the only feasible method by which a large network of light railways could be spread over India ; it was welcomed by Lord Canning, Governor-General of India, as a probable solution of a most difficult problem, and was heartily backed by him during the later months of his stay in India.

The first offer made by the Indian Branch Railway Company was to construct a light line of 4 feet gauge on a road which the Government of Bengal was just then completing between Nalhati Station on the East Indian Railway and Azimganj, situated on one of the effluents of the Ganges and on the road to Murshidabad. This line was actually made without a guarantee and was opened for traffic on 21st December 1863.

This Company then desired to make a light line between Kanpur (Cawnpore) and Lucknow and other lines in Oudh and Rohilkhand, and they actually did complete the Lucknow-Cawnpore line. The Company, however, found that they could not raise sufficient capital to continue their ventures, and appealed to the Secretary of State for a guarantee. This was eventually given, and the Indian Branch Railway Company merged into what was later known as the Oudh and Rohilkhand Railway Company.

The negotiations with the Indian Branch Railway Company were reported to the Secretary of State in April 1864, and the following extracts from a despatch from the Governor-General will show that a gauge narrower than 5′ 6″ was deprecated, unless nothing better could be got without a guarantee :

> "In contemplating the construction of light railways of the 5′ 6″ gauge, Lord Elgin (who had succeeded Lord Canning) had never intended that the engines of the heavy lines should run on them. It was well understood that in England engines of one Company are rarely run on the line of another and that the practical working of railways is not compatible with such a system of interchange of engines, and that all that is ever requisite is the interchange of wagons and carriages. A 5′ 6″ gauge light line was accordingly considered to mean a railway capable of carrying at a moderate speed the ordinary passenger and goods vehicles in use on the Indian main lines.........
>
> "Having these views, Lord Elgin authorised an arrangement being made with Mr. Wilson, by which the character of the Oudh & Rohilkhand lines was to be defined by declaring that the maximum load per wheel should be 3½ tons, and the maximum speed 15 miles an hour. This will allow the ordinary wagon and passenger stock of the East Indian Railway running over the Oudh lines whenever the Ganges bridges are finished. To these arrangements of Lord Elgin we give our complete assent."

The Governor-General's view about the non-interchangeability of locomotives between different lines may sound somewhat quaint in modern times, but he was on firm ground, basing his views on the practice then in force on the British Railways.

3 ft 6 in. Gauge Introduced

It may be added here that the Indian Tramway Company had been allowed to build a line between Arconum and Conjeveram in the Madras Presidency on a gauge of 3′ 6″. This line was 19 miles in length and was opened to traffic on 8 May 1865. Proposals to convert this line into the 5′ 6″ gauge and extend it to Cuddalore and Pondicherry were made at intervals between 1866 and 1868. The Madras Government recommended the extension to Cuddalore ; but when the nature of the country through which the extension would have to pass was considered, that Government could "not recommend any departure from the present (3 feet 6 inches) gauge on which the line from Arconum to Conjeveram has been laid." In 1868 this line was included in the 3 per cent guarantee accorded to the

Carnatic Railway Company, and in turn was absorbed by the South Indian Railway Company in 1874 under their 5 per cent guarantee. It was converted to metre gauge in July 1878.

In March 1869 a series of despatches was sent to England advocating the immediate construction of several lines of railway—some by the agency of companies, and some directly by the State. The policy advocated was that an extension of railways was absolutely essential to the proper development of the resources of India ; that the finances of India could not bear the burden of the proposed additional railways if constructed on the same expensive principle as had hitherto ruled ; that Government was quite capable of making its own lines, and that as it could raise money cheaper than a Company, to make its own lines was the more economical proceeding ; that the position of the several of the proposed lines was such as did not demand a first class standard railway ; and that either a lighter construction, or a narrower gauge, or both, could be adopted with economical advantage ; and that Government, possessing its own railways, would be capable of exercising on the spot a more efficient and economical management than if administered by a Board of Directors in London. The Duke of Argyll, who was then Secretary of State for India, approved of the Governor-General Lord Mayo's proposals almost in their entirety.

The introduction of the metre gauge for certain railways in India arose from this correspondence. We reproduce some portions of the minutes and correspondence that bear on the question of a narrower gauge than the standard gauge of 5 feet 6 inches. Sir John Lawrence, Governor-General, who was succeeded by Lord Mayo, recorded on 9 July 1869 :

> "The character of the line and the amount of expenditure upon it should be regulated as far as possible by a proper consideration of the possible returns, and not more than is essential by any preconceived ideas of what is the best standard form of railway to adopt. I regard it as the extreme of infatuation to lay down any absolute rules to regulate the modes of construction of railways in a country so vast, so various in its natural features, and so poor as India. Still more mistaken is it to apply to India rules essentially based on the wants of England, an island of small size in a highly advanced state of civilization, where dispatch is of extreme importance and the time equivalent to money ; England of all countries is the last which we should take as one model in these things.........
>
> "Skill in engineering works implies the successful adaption of the art of construction to varying circumstances. For a poor country, economy is one of the essential conditions to be complied with, and its requirements may be as rigid as any of those imposed by physical conditions. Wholly to reject railways for a country which is not able to support lines of the most costly description is quite unreasonable ; and if, on a further examination in detail of the probable

cost and returns of any of the lines which otherwise seem desirable, the expense of lines of the ordinary gauge seems prohibitory, while lines of a narrow gauge would be financially practicable, I should consider it a most mistaken view to reject the narrow gauge line."

The Duke of Argyll's despatch in answer to these despatches from the Government of India makes no direct reference to the question of gauge, but merely remarks, in assenting to the principles enunciated, that the Secretary of State "concurs generally in your reasoning, and in the more important conclusions at which you have arrived." It was on the question as to the proper gauge to be adopted on the Indus Valley and the Lahore-Rawalpindi lines that the battle royal of the Indian gauges was fought.

The fact that lines on a gauge of 3′ 6″ had been adopted with more or less success in Norway, Queensland, Chili, and in the Madras Presidency, led the Government of India to think that such a gauge might well suffice for branch lines taking off from the main lines.

At about this time the Secretary of State sent to the Governor-General some reports on the experiments made on the Festiniog and the Mid-Wales 4 feet 8 inches railway, which had been made for the benefit of a Russian Government Commission. He characterised the results of these experiments extremely satisfactory and on the basis of these commended the adoption in India of a gauge narrower than 5′ 6″ (Annexure 5A).

Primary and Secondary Lines

A definite proposal was made that the Indus Valley and Lahore-Rawalpindi lines should be constructed on a gauge of not more than 3′ 6″. This was part of an overall scheme of the Government of India to divide the railways of the country into two classes, and make a broad distinction between the railways till then constructed and which formed a connected system of trunk lines along the great political and commercial routes, and those lines of secondary importance which were about to be taken up to form the network of railways designed to open out new areas. These secondary lines, as proposed, were very extensive and formed a system in themselves, but believing that if built on a smaller gauge the demands for traffic would be amply met and a large saving effected in the initial cost, the Government of India came to the conclusion that substantially built narrow gauge lines, rather than light lines with slow speed on the standard 5′ 6″ gauge, were all that was necessary.

The Government of India proposed to make the whole length of the line from Karachi to Lahore, and eventually on to Peshawar, on a gauge narrower than 5 feet 6 inches. Here it is necessary to make two points clear. First, these lines are no longer a part of the Indian railway system,

but as their construction generated a fierce debate on the question of gauge, the outcome of which determined the width of the lines projected for the future, a detailed account will be in order. Second, the line from Karachi to Peshawar, recognised as a major trunk route in the twentieth century, was according to the limited vision of the nineteenth century British rulers, a line of secondary importance.

The proposal to build the Karachi—Peshawar line on a smaller gauge involved the conversion of about 319 miles between Karachi and Lahore, (Karachi to Kotri 105 miles (165.05 km) and Lahore to Multan 214 miles (344.54 km) which was already opened to traffic on 5 feet 6 ins gauge.

At this stage the Secretary of State asked for the views of the Commander-in-Chief. Lord Napier gave his opinion as follows :

> "Because nearly one-third of the line from Karachi to Lahore is laid and working on the broad gauge ; because of the comparatively easy country of the remaining, two-third ; and especially because of the advantage of accumulating rolling stock of other lines for military emergencies, I am in favour of completing the Indus Valley line with broad gauge."

The Governor-General merely remarked that if narrow gauge was built from Karachi to Peshawar, there would always be the rolling stock of the entire 1,100 miles (1,771 km) available for an emergency on any short section, such as that above Lahore.

The "Narrow Gauge"

Meanwhile, in accordance with the desires of the Government of India, the Secretary of State had nominated a Committee of Engineers to settle the actual width of the "narrow gauge" lines which would be most suited to the needs of India. This Committee reported in September 1870, and, not surprisingly, produced conflicting views, one of these being that a gauge of 2 feet 9 inches was suitable for India. The Committee's deliberations simply confused the issue and were no help to the Secretary of State, who confined himself to expressing his agreement with the desire of the Government of India to observe rigid economy in the construction of the new railways, and eventually concluded by leaving the main question to be decided by the Governor-General, Lord Mayo.

The proceedings of the Government of India on receipt of this despatch are best summed up in the memorandum which Lord Mayo put on record, stating his reasons for adhering to the previous policy of the Government of India, and deciding that the Indus Valley and Peshawar Railway should be on a narrow gauge, and that the width of that gauge should be 3 feet 3 inches.

It was a lengthy memorandum running into some 3,000 words. Lord Mayo referred to the great difference of opinion which existed between the high authorities who were consulted by the Secretary of State in the matter. These differences, he stated, involved him in much difficulty. All the same, considering "unprofessionally such a subject, and in endeavouring to arrive at a sound conclusion as between the two narrow gauges recommended, viz. 3 feet 6 inches and 2 feet 9 inches, "the Governor General was guided by experience and authority that it would be considered quite safe to adopt 3 feet 6 inches gauge, which had been well and effectively tried and was admitted to be sufficient for the conveyance of a large amount of traffic."

Lord Mayo noted that those governments and authorities who were desirous of providing cheap narrow gauge railways, namely Russia, Canada, Queensland, and Norway, had adopted the 3 feet 6 inches gauge.

While acknowledging the ability and judgement of the engineers who had recommended the 2 ft 9 ins. gauge, the Governor-General stated that he was not prepared to recommend the adoption in India of any system which had not stood the test of experience, and was not supported by the almost unanimous opinion of skilled engineers. He concluded with the words :

> "I think, therefore, that the adoption of a 3 feet 6 inches gauge would be a thoroughly safe course for us to take ; but if a 3 feet 3 inches one will provide for all the possible equipments of the country, I should prefer it. Some saving in cost would be gained. The small reduction in width could not effect the locomotive question, and a considerable economy of space would be obtained. This would give a carriage of 6 feet width in the interior, and would seat four third class passengers in a row, allowing 18 inches to each seat."

As the matter had been left to the discretion of the Governor-General, no sooner had Lord Mayo given his verdict in favour of the 3 feet 6 inches gauge, than orders were issued that the Indus Valley Railway, the Lahore-Rawalpindi line, the lines in Rajputana from Agra and Delhi towards Ajmer, and the line from the Great Indian Peninsula Railway to Indore in Central India should be constructed on this gauge. The section between Lahore and Jhelum had already been commenced as a light railway on the 5′ 6″ gauge, but the work had not progressed as far as to require any considerable alterations. Surveys and estimates for the other lines were then undertaken on the basis of the gauge being one metre and the construction of the lines was vigorously persued.

The Battle Goes On

The decision, however, did not put an end to the battle of the gauges. The scene shifted to England, where Mr Lee Smith, the engineer who had been originally sent out by the Secretary of State to construct the Lahore-Rawalpindi line, claimed that a light railway on the 5 ft 6 ins gauge could

be built between Karachi and Peshawar for nearly the same sum as the approved estimates for metre gauge. Several other engineers continued the debate which received a lot of newspaper publicity.

In the House of Commons, where much difference of opinion was expressed during the debate, "Mr Gladstone, the Prime Minister, intimated that the arguments on both sides would be carefully examined in the light of the discussion, and in the light of such other facts and arguments as may be considered to bear upon the policy involved."

In consequence of all this opposition to the change of gauge, and in conformity with the promise made by the Prime Minister in the House of Commons, the Duke of Argyll reviewed the whole case in a lengthy despatch to the Government of India. In this review the Secretary of State showed that lines on the 5′ 6″ gauge connected the three presidency towns of India, the principal centres of commerce in the Ganges Valley and as far north as Lahore, that the amount of money that had been sunk in the guaranteed capital of railways was very large, nearly £ 94,000,000, and that the profits of the railways returned only a very small percentage on the outlay ; and that as far as the commercial aspects of the districts round Lahore were concerned, it appeared that, Karachi being its natural outlet, a railway on the metre gauge would amply cope with commercial demands. But as far as the military requirements of the North-West frontier are concerned, the matter might be different, it was on this aspect of the question that doubts of the soundness of the policy pursued had been raised.

That despatch was received in India in April 1873, and the position at the time was as follows : considerable progress had been made on the Punjab Northern Railway on the metre gauge, and the girders for the bridges over the Ravi, Chenab, and Jhelum rivers were made for that gauge. On the Indus Valley Railway work on the metre gauge had been progressing fairly well, and a good start had been made on the bridging of flood openings required to pass the spill waters of the Indus. Also on both lines, a large outlay had been incurred on the permanent way, locomotives, and rolling stock adapted to the metre gauge, and a good deal of this material was already in the country. No arrangements had been entered into or proposals made to the Sind, Punjab, and Delhi Railway Company for the provision of a third rail along their line between Karachi and Kotri and between Multan and Lahore, so that, as far as was contemplated at that time, there would be a break of gauge at Kotri and another at Multan. Moreover, the contract with the Sind, Punjab and Delhi Railway Company was not determinable until 1885, so that any radical alterations of their lines could only be accomplished by arrangement.

Military Considerations

The Commander-in-Chief was asked to support his opinion with statistics giving the relative value of the two gauges for military purposes and the effect of a break of gauge in the movement of such bodies of troops as Lord Napier might think were likely to be moved in the case of war on the North West Frontier.

An exercise for concentrating 10,000 men and 36 guns was worked out by the Quarter Master General, and the relative capabilities of the broad and the metre gauge railways presented in an elaborate memorandum to show that the arguments and statistics contained therein not only conclusively proved the great advantage which the broad gauge possessed over the metre gauge for military purposes, but would justify the Government of India in undertaking the expense of a reversion to the broad gauge on both the Indus Valley and the Punjab Northern Railways.

It had been ordered that the Punjab Northern Railway should as far as possible, use a portion of the grand trunk road north of Lahore, and the works then being carried out occupied a portion of that road almost continuously between Lahore and Wazirabad, a distance of 60 miles (96.6 km). Among other deductions drawn from the Quarter Master General's memorandum was the one "that if the narrow gauge be determined upon, the railway will be used almost exclusively for the transport of stores, etc., and the great mass of the troops will have to march ; it is, therefore, most essential that they should be able to do so with speed and regularity."

Consequently the Commander-in-Chief represented the vital importance of keeping the grand trunk road free for the movement of troops by route march. Quite apart, however, from the deductions drawn from the Army Headquarters' memorandum, the Government of India had already recognised that their original orders to lay important railways on existing roads required modifications as the existence of a railway did not do away with the necessity of parallel road communication ; consequently this point was readily recognised and used in the reply sent to the Secretary of State.

The Consulting Engineer to the Government of India for State Railways, Mr Molesworth, then proceeded to discuss from a military point of view the several railways in Western India with reference to strategical positions. He recommended a comprehensive system of metre gauge lines which would include the Punjab Northern, Indus Valley and Rajputana lines, and would necessitate the conversion to metre gauge of the Sind, Punjab and Delhi and the Bombay, Baroda and Central India Railways. If such a system was adopted and a uniform policy kept in view, he considered that the adoption of the metre gauge would be completely justified.

But if, on the other hand, the Government should consider that such a comprehensive system was too remote or too difficult of attainment, and that the metre gauge system would remain a series of railways isolated, and disconnected, then he considered that the introduction of the metre gauge system was a mistake.

Colonel Dickens, the then Secretary in the Public Works Department, Government of India, reviewed the whole case in a note, which was attached to the reply sent to the Secretary of State. In this he stated his concurrence in most of the arguments which Mr Molesworth had brought forward and supported that gentleman entirely in the sufficiency of the metre gauge even for military operations. Colonel Dickens concluded his note thus : "If any military mishap should occur after the establishment on these lines of the metre gauge, the Government would be said to have courted disaster. Nothing of the kind can be laid to their charge if they adopt the style of construction which has been in use in India heretofore to the satisfaction of the highest military authorities. Hereafter when the metre gauge shall have been tried and gained confidence, it may be quite proper to introduce it on the Indus Valley and Lahore and Peshawar lines. But for the present I come (very unwillingly, I confess) to the conclusion that the progress of works should be so far delayed as to allow for the introduction of the $5\frac{1}{2}$ feet gauge with the 60-lb rail.

"I think also that the occupation by the railway of the Lahore and Peshawar road should be given up. But the railway should by no means taken to such a distance from the road as to be out of reach of easy military communication throughout the route.

"The extra expense of the adoption of the broad gauge in their case I would regard as a military and political expense, and not as a part of the general system for the the extension of railways in India.

"The extra cost of adopting the broad gauge with the 60-lb rail is estimated by

Mr. Molesworth at	£ 1,536,200
To abandon the trunk road between Lahore and Jhelum as well as between Jhelum and Peshawar, would probably cost	£ 360,000
Total	£ 1,896,200

The interest on this sum is less than the cost of maintaining one regiment "of European infantry."

These opinions were duly weighed by the Government of India, and the Duke of Argyll's despatch, dated 27 March 1873, was replied to on the 19 July 1873.

Financial Considerations

The despatch was signed by all the Council, but in the opinions expressed they were not unanimous. Dissents against a new departure from the existing policy were recorded by the Finance Member and the Member in charge of Public Works ; and these dissents were sent to London with the despatch.

The question of the change of gauge was a serious one and was discussed by the British Cabinet. On 18 November 1873, the Duke of Argyll telegraphed to Lord Northbrook :

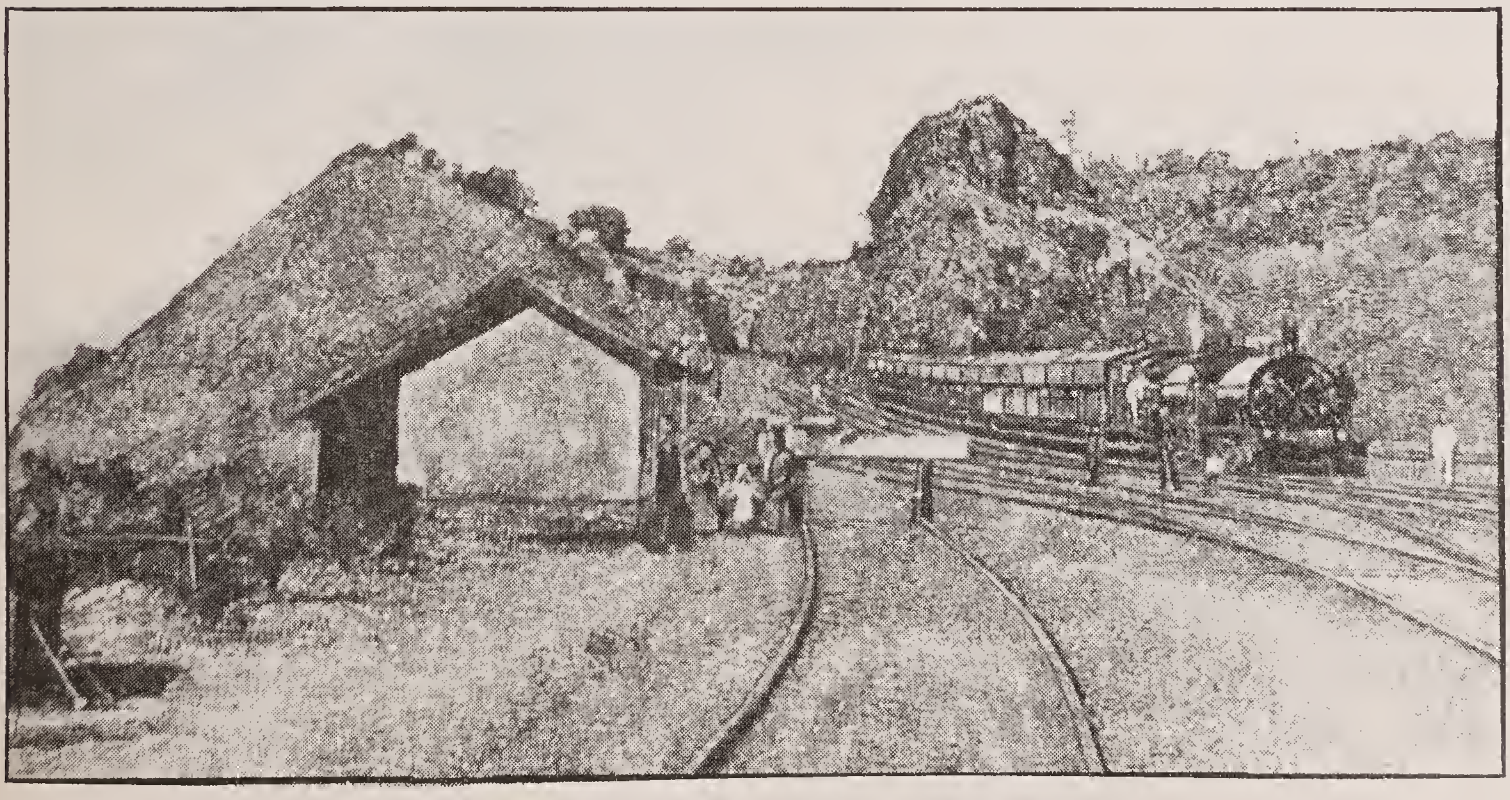
> "Cabinet consulted gauge question unanimously with me, in declining to expend million and a quarter excess beyond estimate for narrow gauge ; but we will not overrule you if you determine after receiving our despatch to take standard gauge with 45 lb rail, as Molesworth suggests."

But notwithstanding the fact that the Sind, Punjab and Delhi Railway Company had agreed to modify their engines so as to render practicable the Indus Valley Railways being made on the standard gauge with a 45 lb rail, the Government of India decided not to adopt the broad gauge with 45 lb rail. The Government of India disclaimed that the question of gauge had been re-opened at its instance ; but since the Duke of Argyll had permitted its review, Lord Northbrook, the Governor-General, was of the opinion that it had been a mistaken policy to think of constructing either the Indus Valley or the Punjab Northern on the metre gauge, and that nothing short of the standard gauge with a 60 lb rail would satisfy the exigencies of the case.

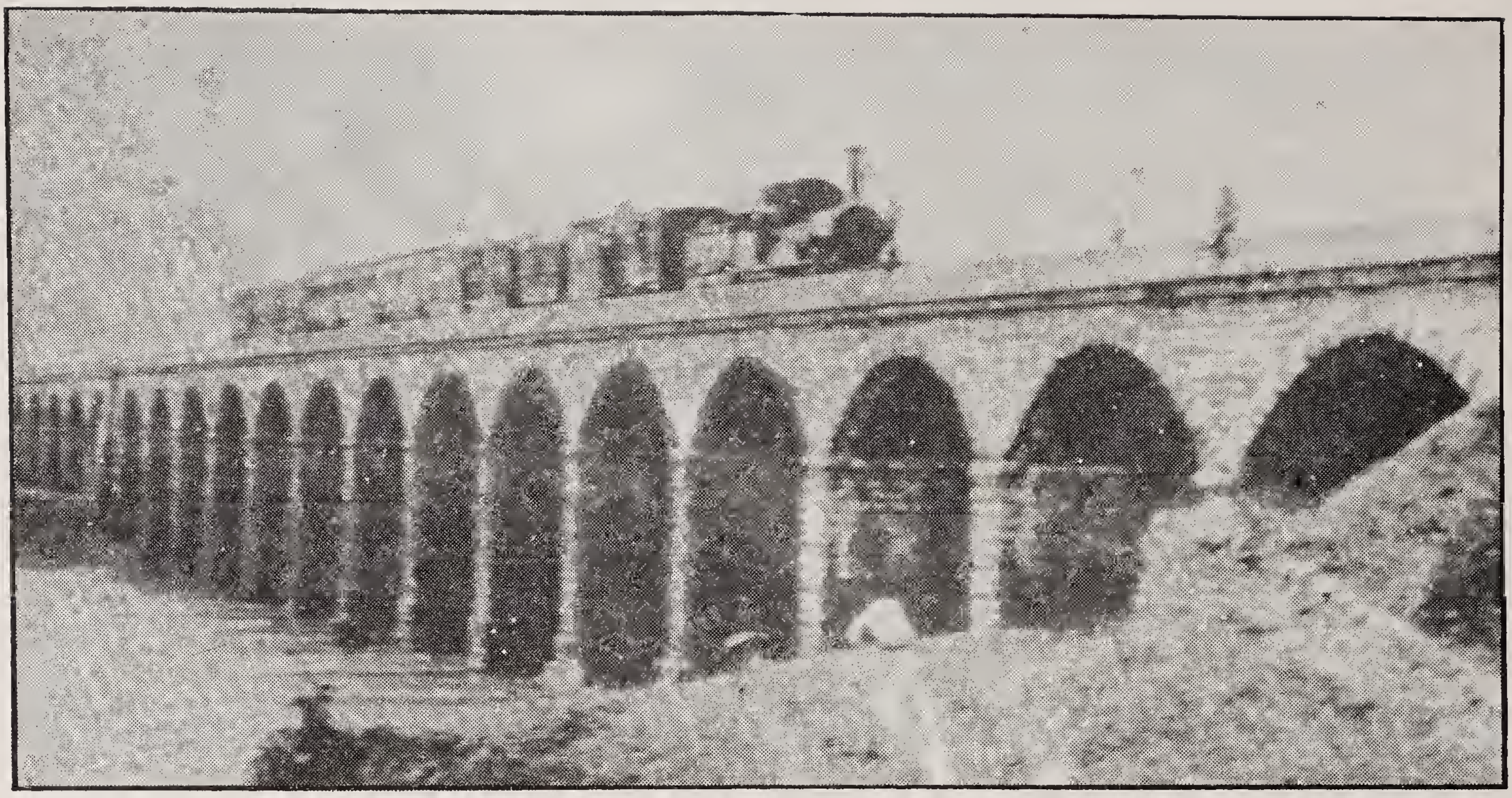
Apart from the gauge question, the Government of India showed in this despatch that the works on the Punjab Northern Railway had proceeded so far that it was much better to allow the metre gauge line, which had been laid along the side of the grand trunk road, to be finished and used as a temporary line, pending the decision of the gauge for the permanent line which was to be made off the road.

The gauge question was, however, decided early in June 1874, as the Secretary of State telegraphed that the standard gauge and rails were sanctioned for the Indus Valley line. As this was the last of the despatches on the question, and recorded a very important decision, employing more than a thousand words to do so, it may be as well to repeat here the operative part :

Realignment of Bhore Ghat Tunnel No. 3



The Reversing Station, Bhore Ghat Incline

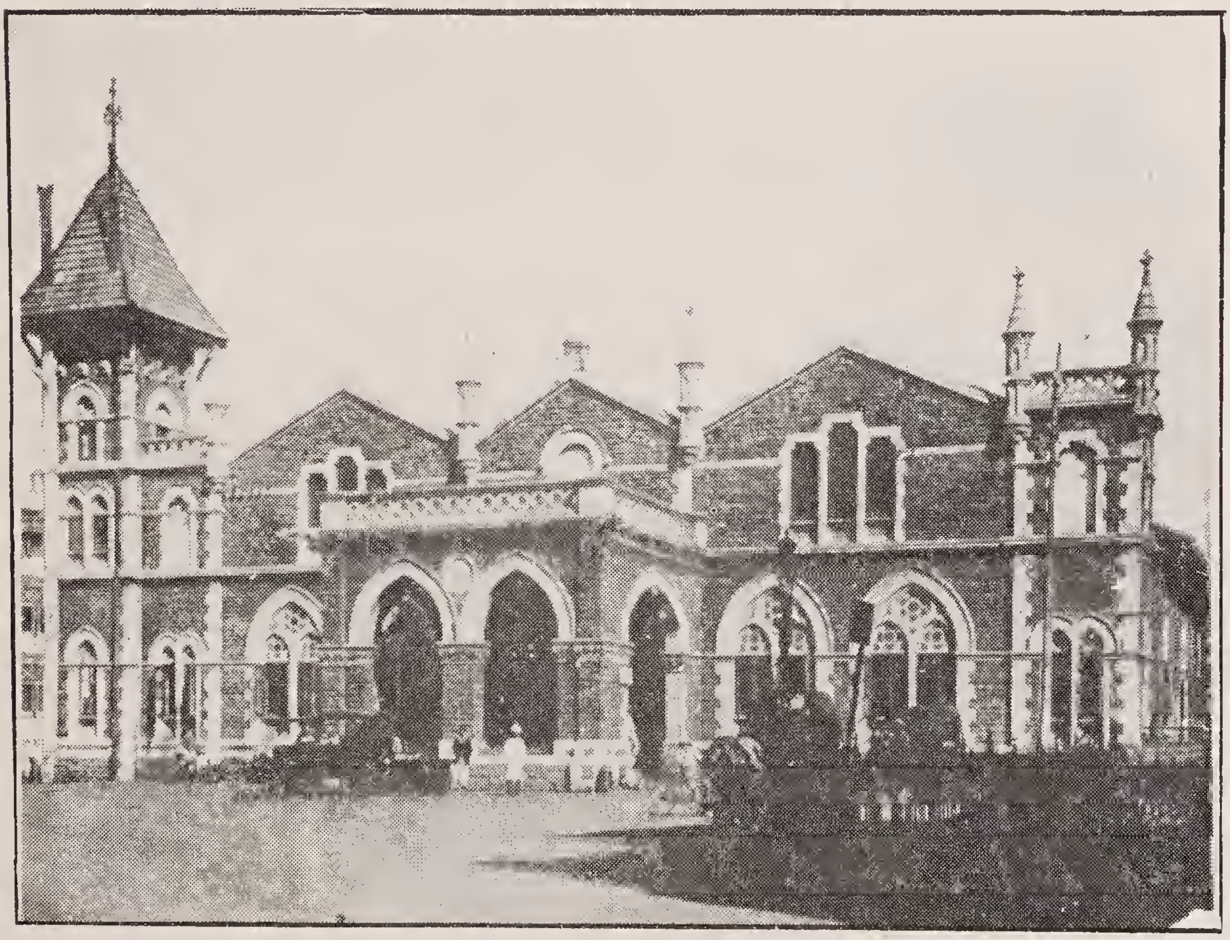


The first train on the Thana Creek

WR-6 The "Church Gate" from which Churchgate station derives its name — The name Churchgate turns back the pages of history. Up to the year 1982 the Fort area had three gates. One of these was called Church Gate, as it led to the Church "St. Thomas" Cathedral nearby even as it stands today. The "Church Gate" stood where Flora Fountain stands today.

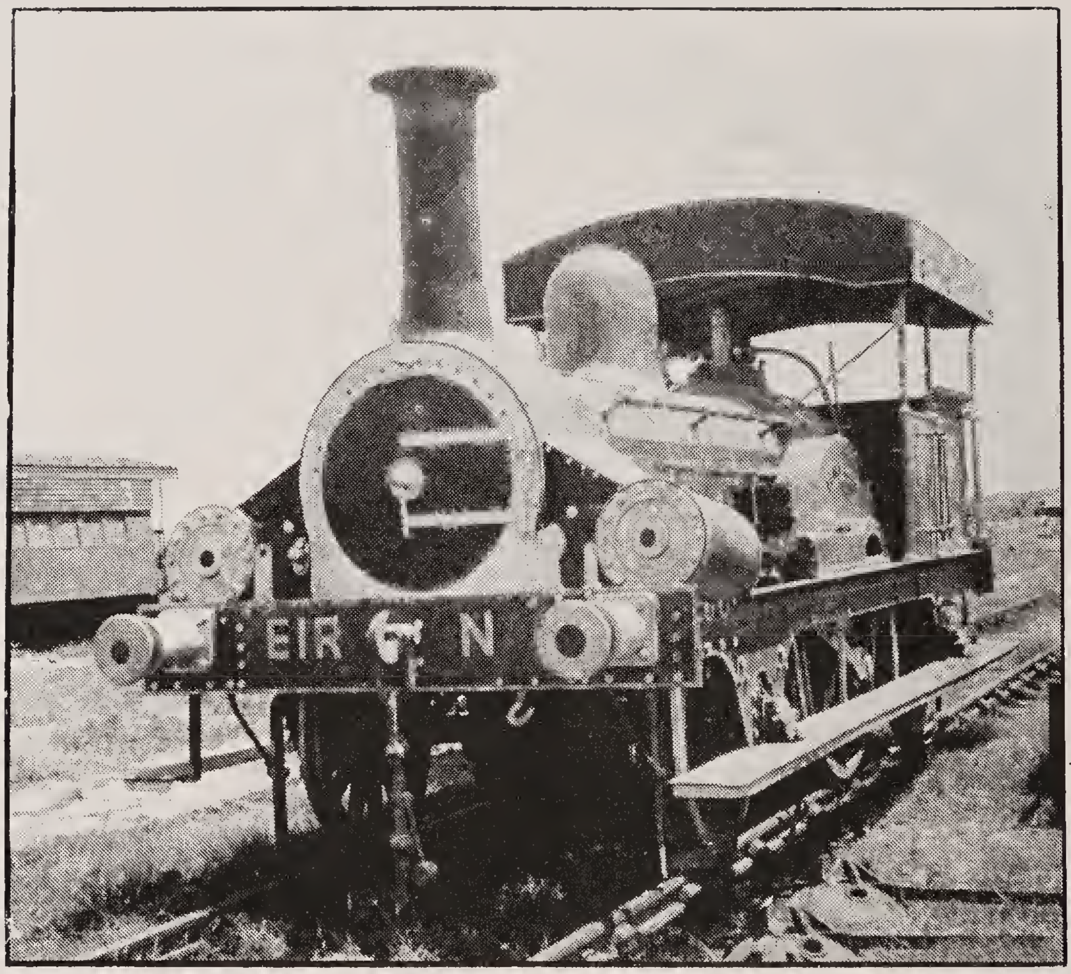
From the collection of Parsi Panchayat Museum

Old Grant Road station in Bombay built in 1864.



WR-4 Colaba Station was the old terminus of the former BB&CI Railway in Bombay. The station was connected with a rail line cutting across the areas occupied at present by the long series of the flats facing the Oval Maidan. The station was pulled down in 1930.

From the collection of Parsi Panchayat Museum, Bombay.

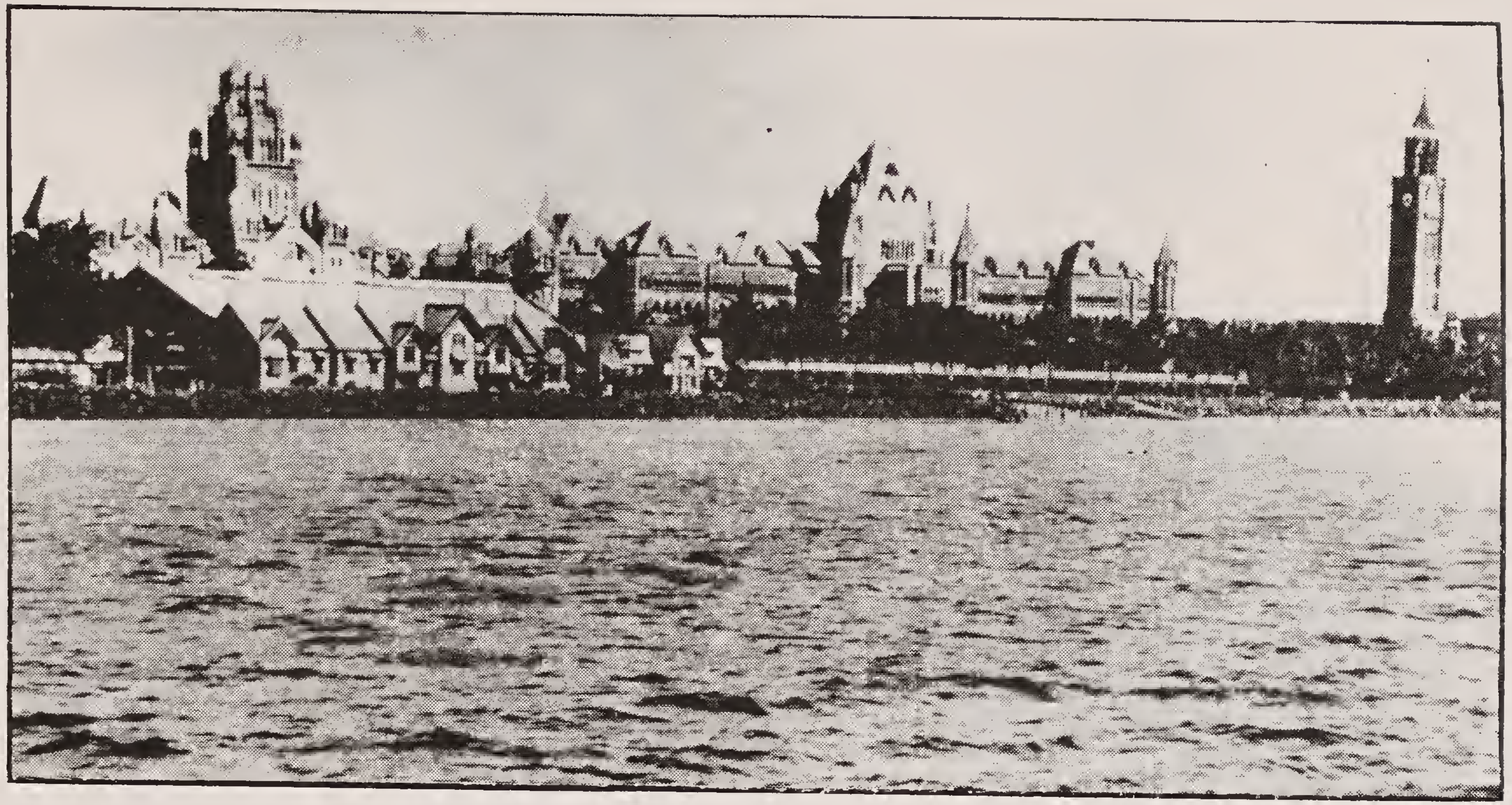


The Fairy Queen.

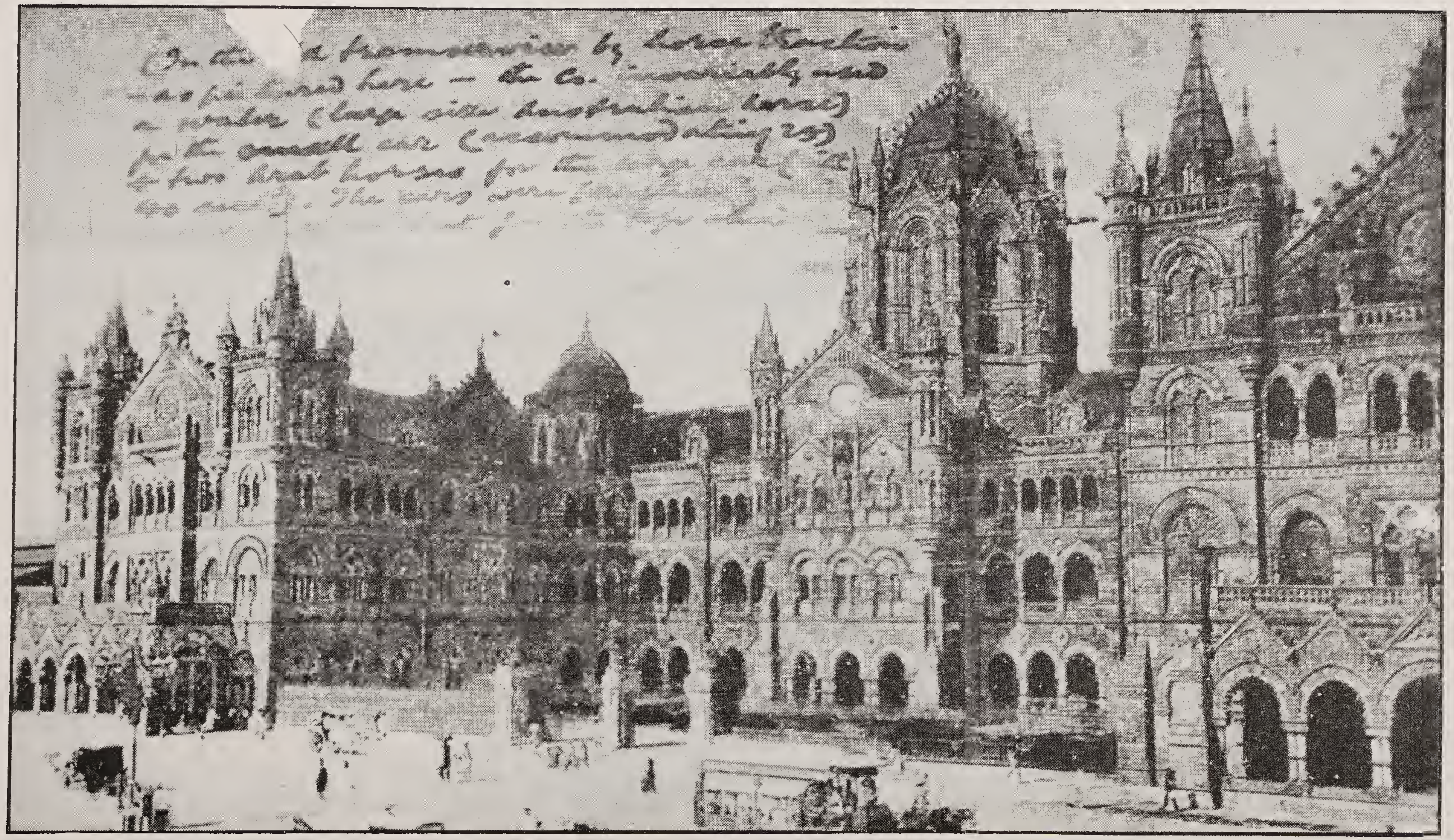
The 'Fairy Queen' is the oldest surviving locomotive in perfect working order anywhere in the world. This locomotive was purchased by the East Indian Railway in 1855 barely two years after inauguration of first train service in India. The same class of locomotive had the pride of working the first passenger train which steamed out of Howrah Station on 15th August 1854, on the experimental line of the East Indian Railway.

'Fairy Queen' was used for hauling light mail trains between Howrah and Raniganj, covering 121 miles in five hours. The 'Fairy Queen' ended its working life as a construction engine on the Bihar lines in 1909. After its withdrawal from service, it was placed on a pedestal outside Howrah Station from 1909 to 1943. It was at the Zonal Training School, Chandausi from 1943 to 1972, from where at the time of inauguration of the 'Rail Transport Museum', it was brought to New Delhi. At the museum, it was restored to working order and painted in its original colour. Occasionally it steams in the exotic yard of the museum, for distinguished visitors.

Makers : Kitson Thompson and Hewitson of Leeds, U.K. **Year :** 1855. **Railway :** East Indian Railway. **Gauge :** 5'6". **Weight :** 26 tons. **Wheel Arrangement :** 2-2-2 WT (underslug water tank). **Frame :** Double plate. **Numbers :** Maker's number 481; Original EIR number 22; Re-numbered 92 in 1881; Re-numbered 101 in 1884. Named 'Fairy Queen' in 1895.

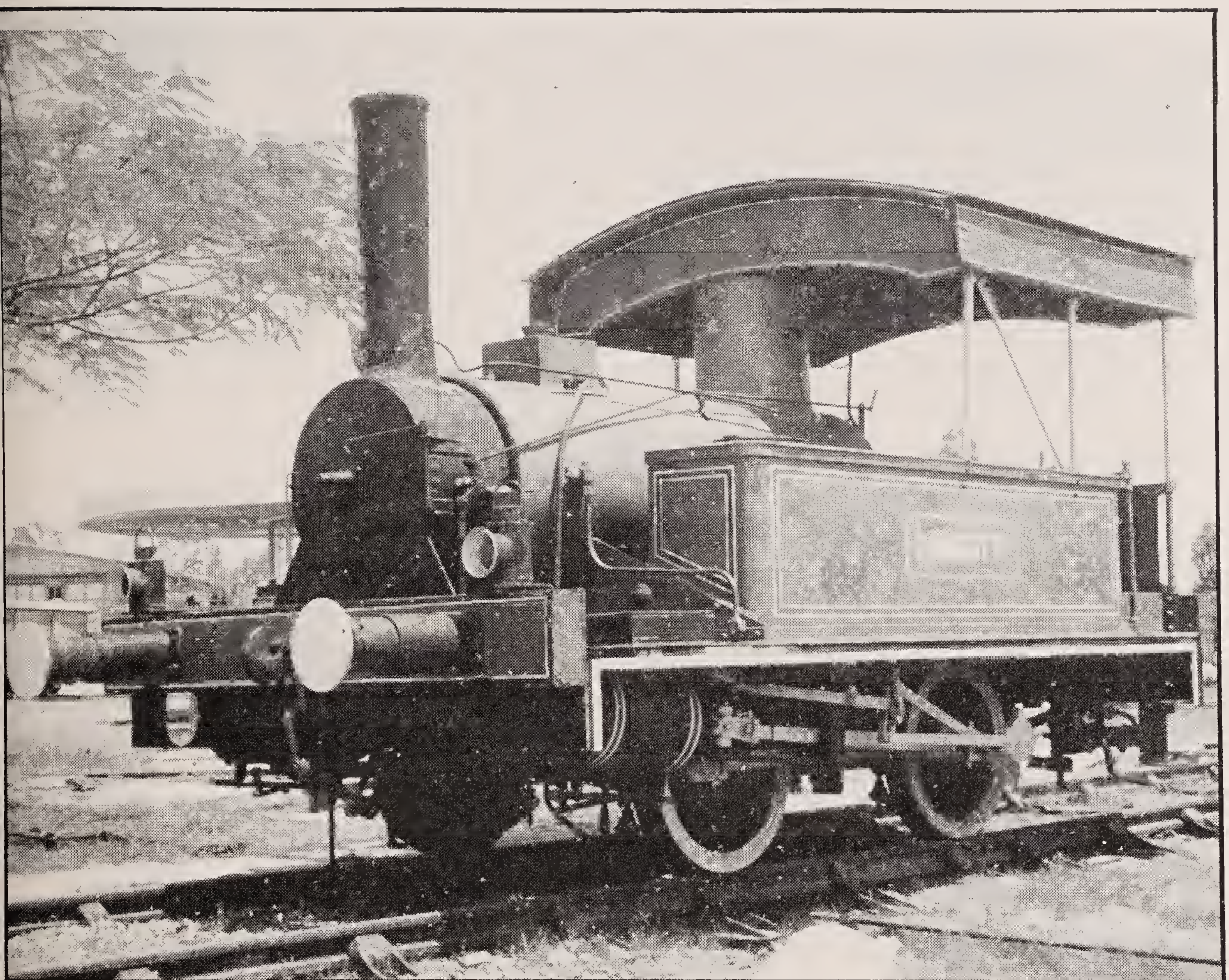


A panoramic view of the Churchgate area at the turn of the century — This photograph was taken from a boat when the work of Churchgate Reclamation was in progress. The sea which once touched the Churchgate Station has now been pushed back and the area is heavily built up. On the right a train from Colaba is seen entering Churchgate Station.



Victoria Terminus, Bombay. The hand-written note reads, "In the old tramservice by horse traction—as pictured here—The Company invariably used a waler (large size Australian horse) for the small car (accommodating 25) and two Arab horses) for the small car (with 40 seats). The Cars were practically altogether open but for the top shelter.

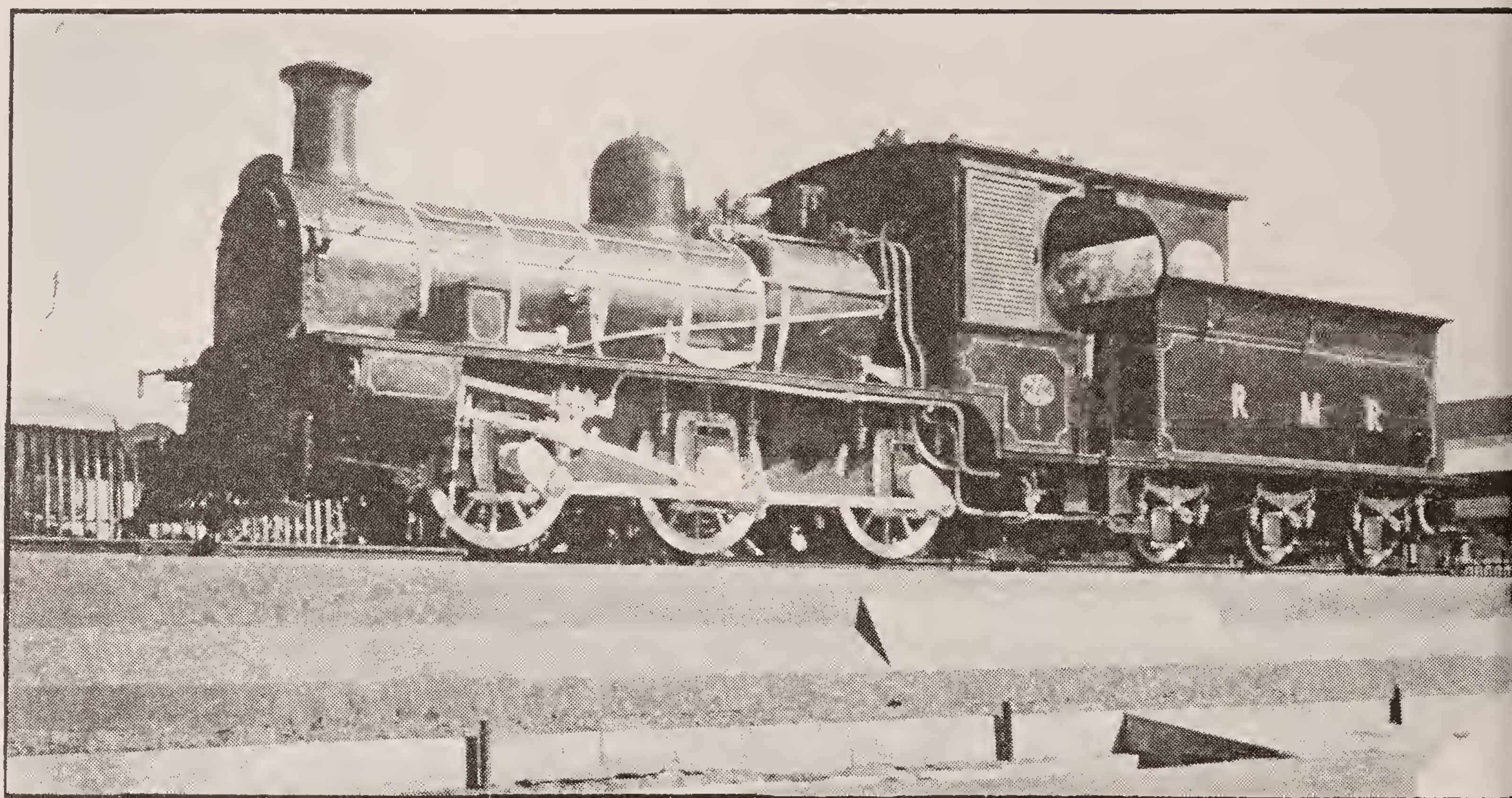
From Parsi Panchayat Museum, Bombay.



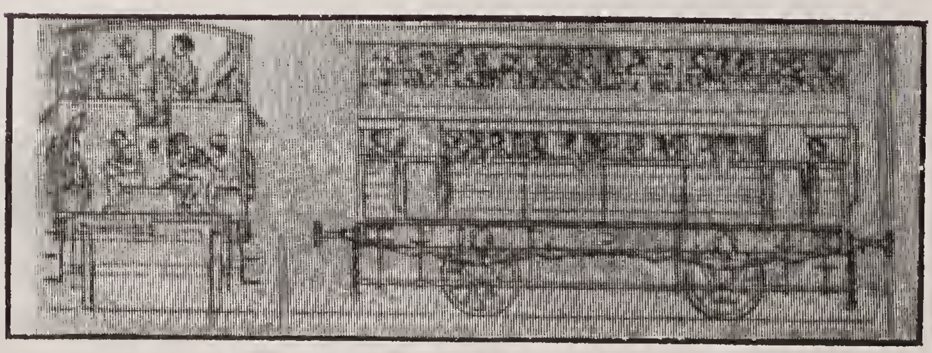
Ramgotty

'Ramgotty', a French built locomotive was used on the 4'0" gauge section of Nalhati Azimgunj Section upto 1895. Later this locomotive was altered to 5'6" gauge and was used as a shunter in Jamalpur Workshops. It was withdrawn from service for Calcutta Corporation, where it used to haul refuse wagons to Entally.

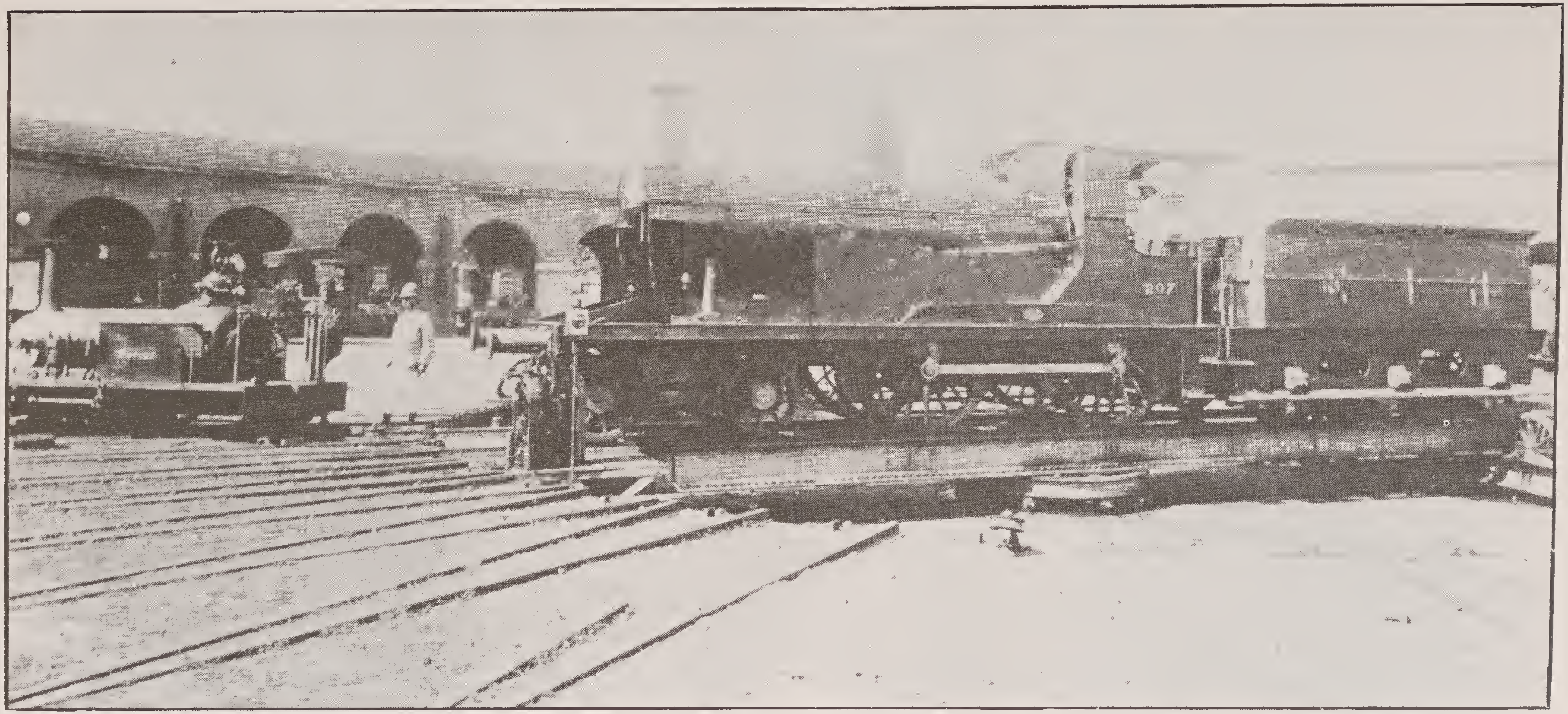
Makers . Anjubuilt of Paris, France
Year : 1862
Railway : Nalhati-Azamganj line and later East Indian Railway
Gauge : Originally built 4'0" altered to 5'6" in 1896
Weight : 20 tons
Wheel arrangements . 0-4-0 T (side tank)
Frame . Inside plate
Cylinders . Two 14"×22" outside
Valve Gear : Gooch Link Motion
Feed . One injector



F-734—this was the first locomotive built in India in 1895. Prior to it some engines were assembled (from spares supplied with complete locomotives from England) at Jamalpur Workshops as early as 1868. The connecting rods are inside and the side rods outside. It was used for mixed traffic initially on Rajputana Malwa Railway and later on the B.B. & C.I. Rly.

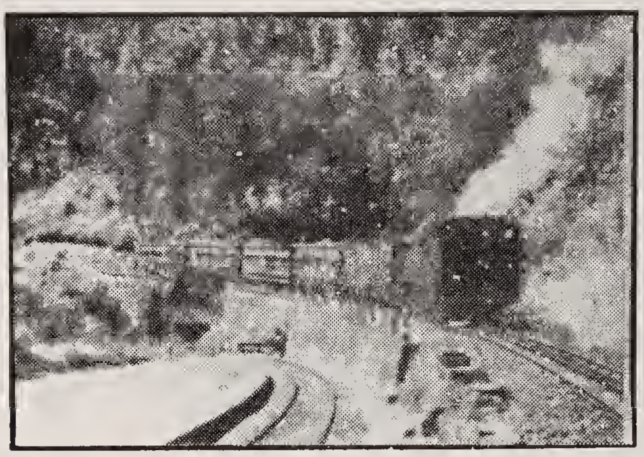


A double-decker third class carriage in use on the B.B. & C.I. Railway in the 1860s.



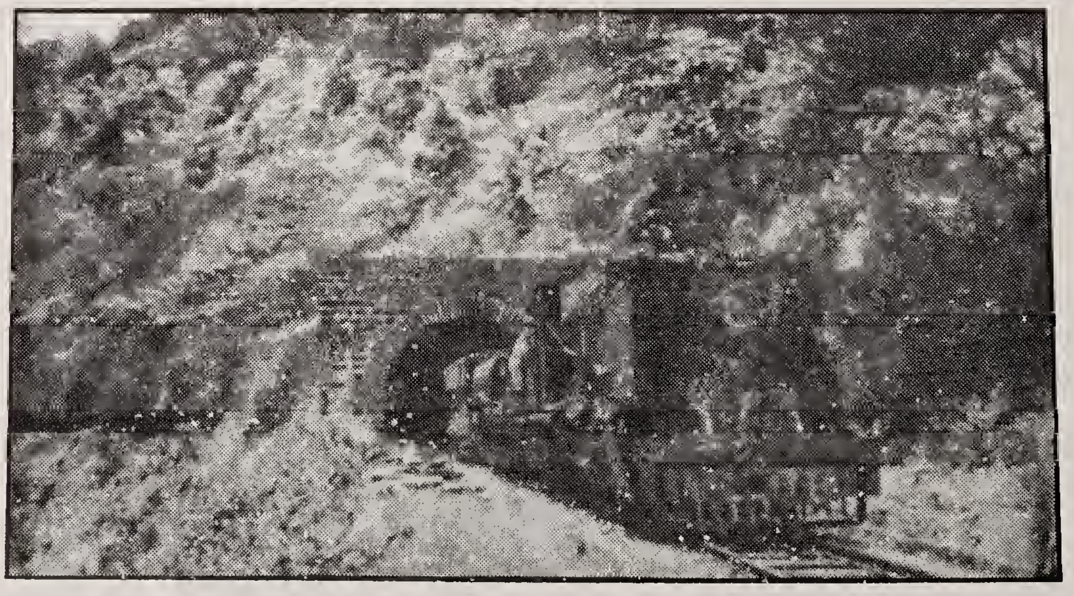
The largest, No 207, and the smallest 'Phylli's Locomotives on the line — from a photo album of the East Indian Railway Workshop at Jamalpur, dated 30 November 1897.

India Office Library, London.

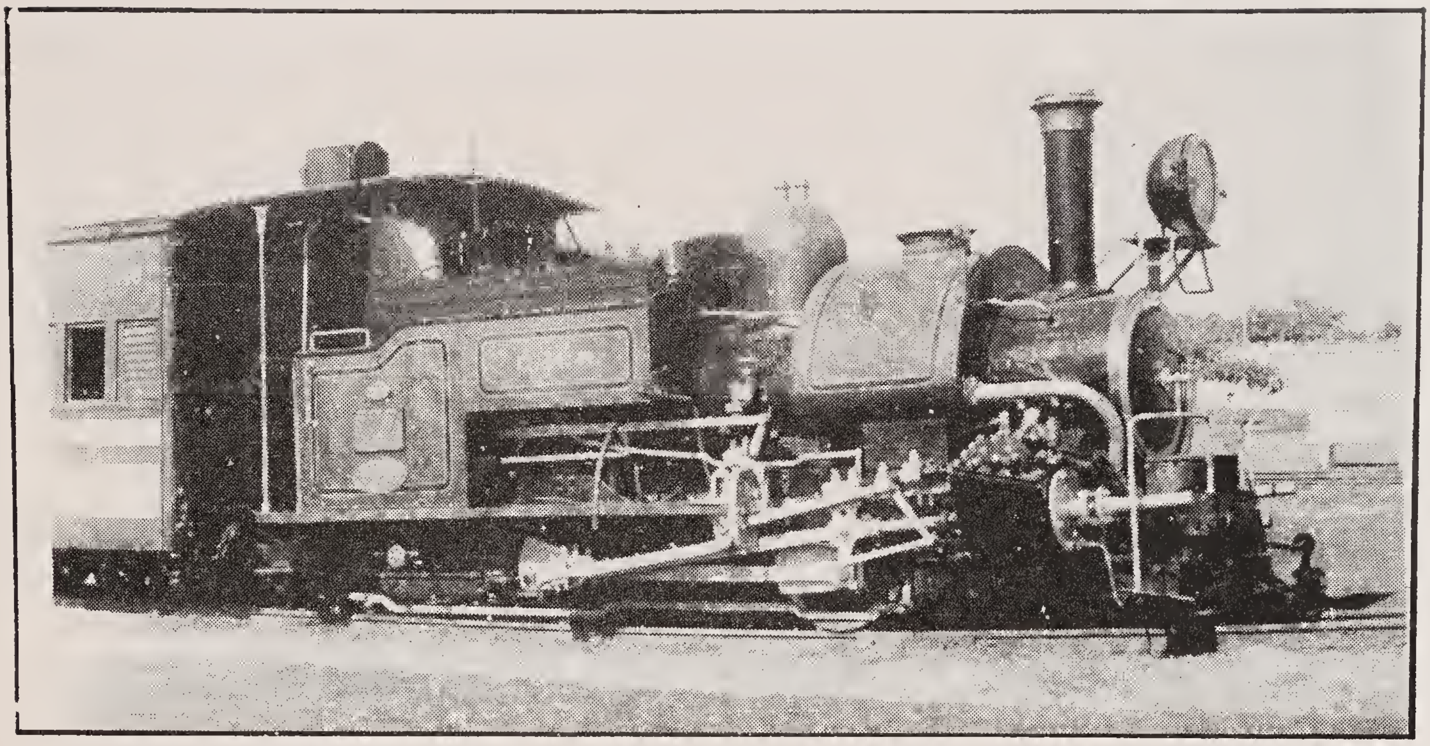


An example of the loop system on the Darjeeling Hill Railway.

A view of the passenger train on the Nilgiri Railway assending on a deep gradient of 1 in 12.



A view of the Hill Section between Badarpur and Lumding on the Northeast Fronteir Railway.



B-777—in 1889, Sharp Stewart & Co. built four prototype engines for DHR. After success, 30 more such engines were supplied which are still in service. This engine was one of the prototypes, rebuilt in 1917 at Tindharia Workshops and withdrawn from service in 1952.

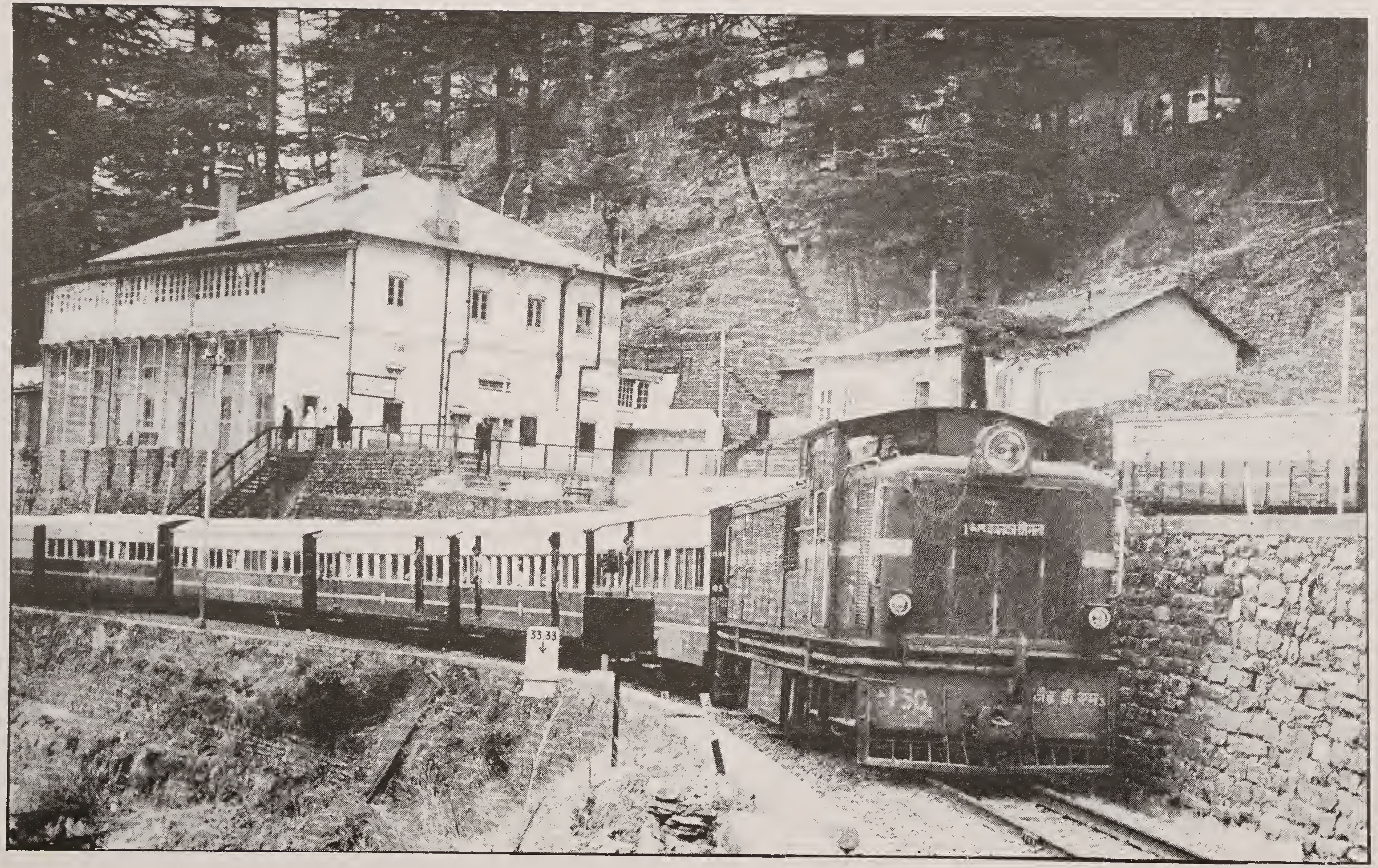
Makers : Sharp, Stewart & Co.
Atlas Works, Glasgow

Year : 1889

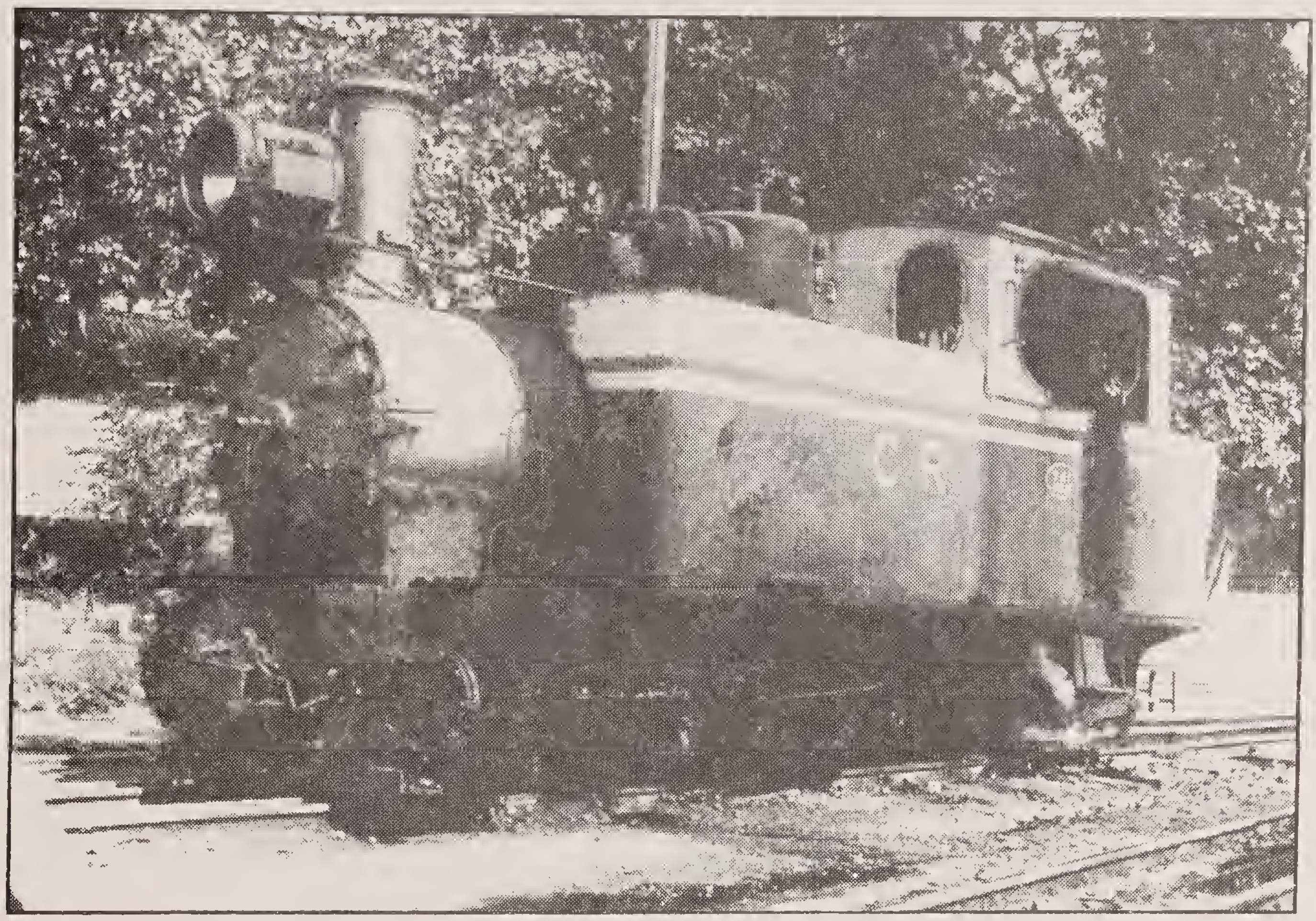
Railway : Darjeeling Himalayan Railway
Gauge : 2'-0"
Wheel Arrangements 0-4-0 ST (Saddle and also underslung)

Numbers : Makers 3517 Original DHR B-2, Altered to B-777.

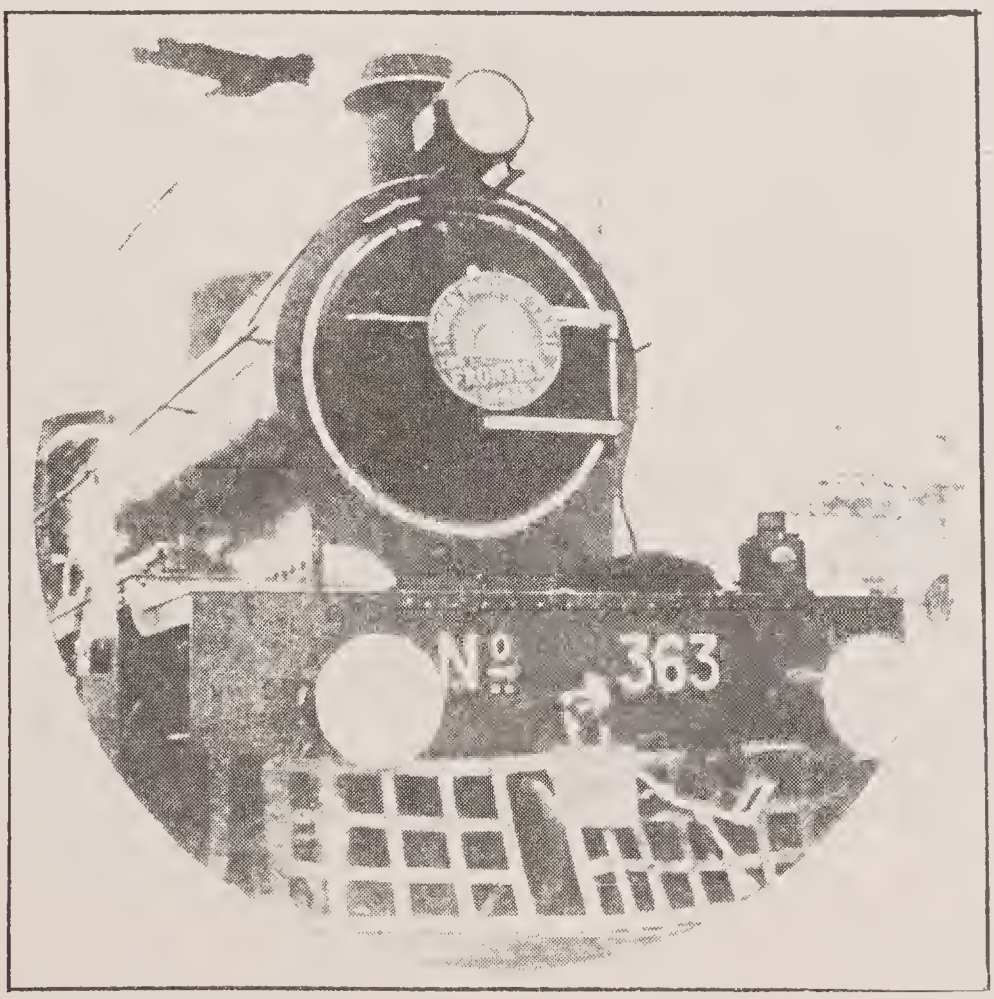
Kalka Station—A railcar in use on the Kalka Simla Railway ready to leave for Simla.



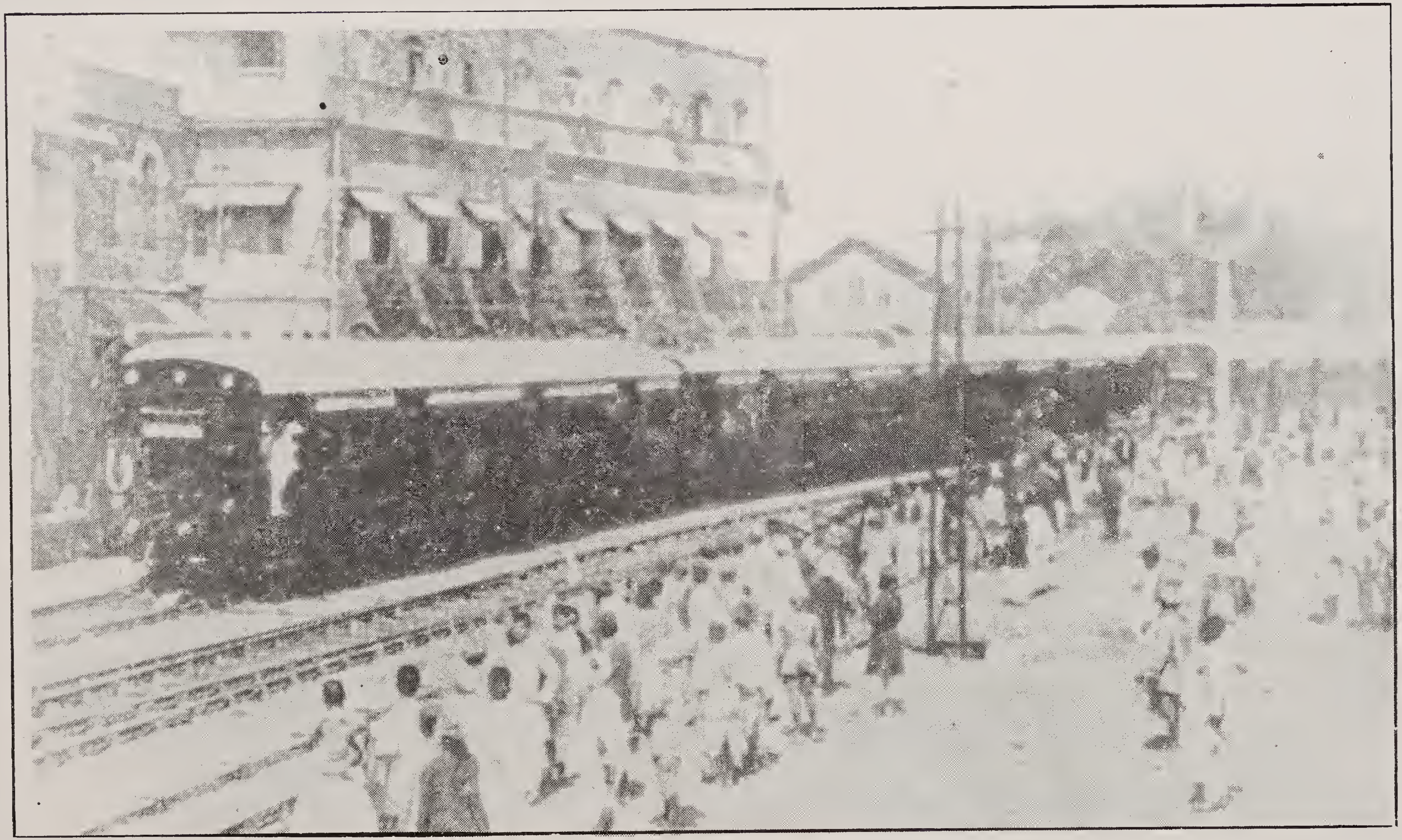
ZDM 3 diesel locomotive hauling a passenger train on Kalka-Simla Railway, built at Chittaranjan Locomotive Works.



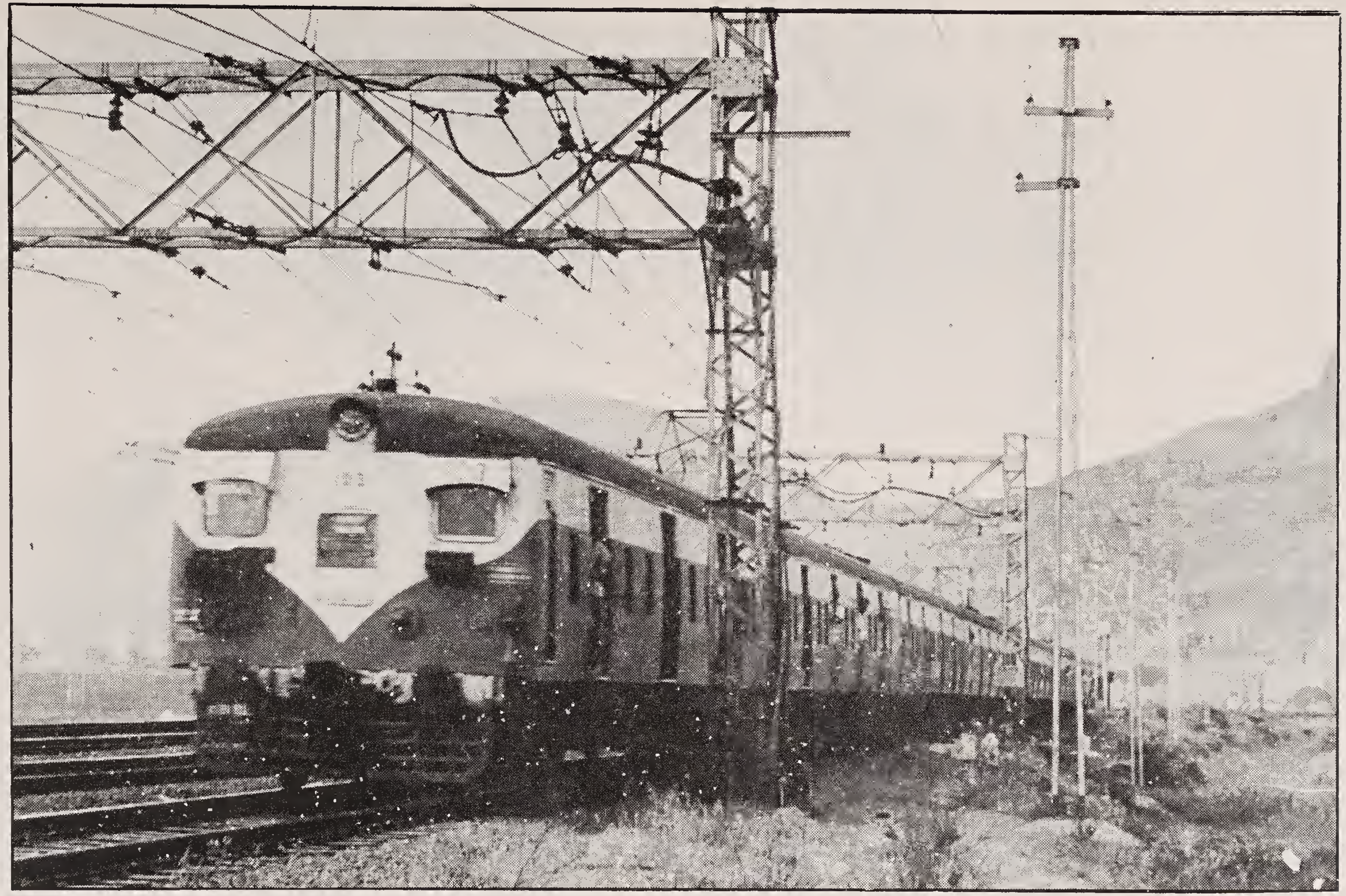
A locomotive on Neral-Matheran hill railway. Matheran is situated 96 km from Bombay at an average height of 760 metres above sea level.



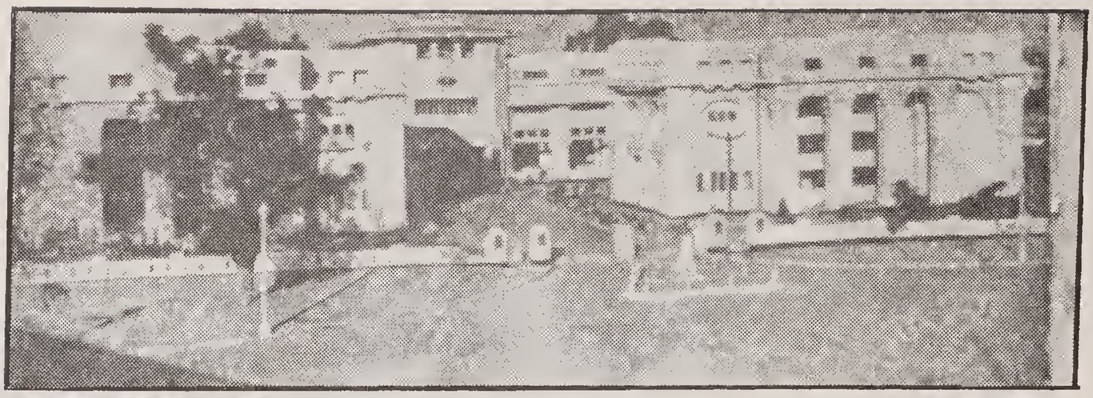
The engine of the Frontier Mail on its inaugural run on September 1, 1928. It was India's fastest train at that time.



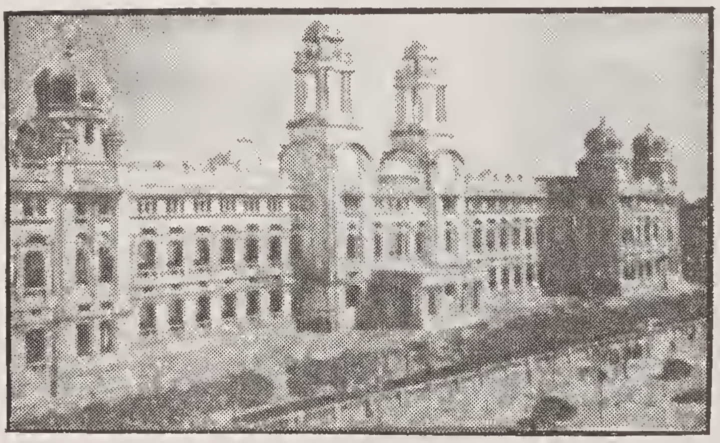
Crowd watching the first electric train with the Governor of Bombay on board leaving Bombay V.T. on February 3, 1925. A report in the G.I.P. Railway magazine of 1925 stated : "Crowd of interested observers watch daily the arrival and departure of the train and their interest does not cease there, for the trains have been running full ever since the opening day".



An Electric Multiple Unit (EMU) train in a suburban section. Over 54 per cent of the passenger journeys made on the Indian railways are in the suburban areas.

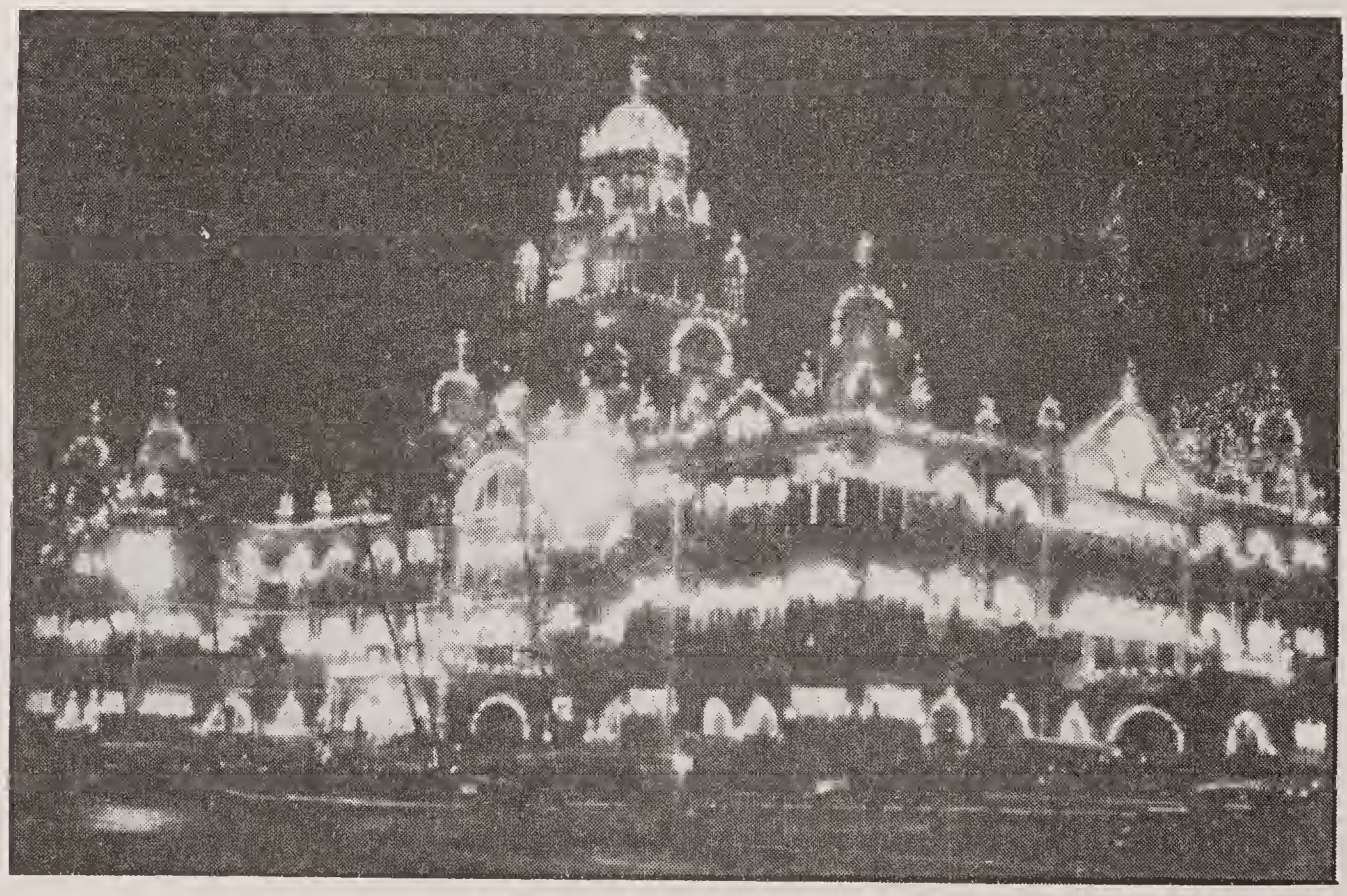


a. General Offices, ex-South Indian Railway, Trichinopoly



b. Bengal Nagpur Railway Headquarters, Garden Reach, Calcutta

c. South Railway Headquarters, Madras.



Indian Railways completed a century of service on 16 April 1853. While the main celebration was at the Centenary Exhibition Grounds, New Delhi, the occasion was observed in an appropriate manner at all zonal and divisional headquarters and important stations. Here the Headquarters of the Western Railway at Churchgate, Bombay is illuminated.

"I have come to the conclusion that it would not be consistent with my duty to allow these uncertain financial expectations to outweigh the great strategic and political dangers which are constantly growing in importance, and which authorities so high as your Excellency and the Commander-in-Chief concur, with many others, in pressing upon Her Majesty's Government.

"I have, therefore, to inform your Excellency that the construction of the Indus Valley Railway from Kotri to Mooltan upon the standard gauge, and with the 60 lb rail, is sanctioned. I should extend the same instruction to the railway from Lahore to Peshawar, if I did not gather from your despatches that the preparations for laying a narrow gauge railway between those points were more advanced towards completion. There appears to be some doubt whether an immediate change of gauge might not involve both a greater sacrifice of money and time than the advantages to be gained. For the purpose of deciding this question, detailed information as to the progress of the works is necessary, which is only accessible in India. I leave it, therefore, absolutely to Your Excellency to decide whether the whole or any part of the line between Lahore and Peshawar shall be completed for the present on the narrow gauge. If considerations, derived from the advanced state of the works, should not, in your judgement, be of sufficient importance to influence your decision, this railway will be constructed on the same gauge as the Indus Valley line."

This despatch set at rest the question of gauge on these two lines ; and they were opened on the 5 ft 6 inch gauge.

For several years before it had been the desire of both the Guaranteed Railway Companies, with the termini in Bombay, to extend their lines northwards, and get an entrance into the Gangetic Valley. The Bombay, Baroda and Central India Railway Company had even been permitted to make a series of surveys as far north as Agra and Delhi ; and the Great Indian Peninsula Railway Company was desirous of extending its system into Malwa by means of a branch to Indore. The decision of Lord Mayo's Government to stop all further guarantees on the old system, and for the Government to undertake the construction of its own railways, including the lines through the States of Rajputana and Central India, came in the way of these proposals.

Break of Gauge Adopted

Surveys between Ahmedabad and Ajmer were commenced by the Government of India towards the end of 1872, with a view to eventually

running a railway on the metre gauge through that part of Rajputana. The Government of Bombay, whose views on the subject had been invited, regretted that the line was not to be built on the standard gauge, but as a break of gauge had been determined upon, recommended that it should take place at Palanpur, and not at Ahmedabad, as the province of Gujarat was sufficiently fertile to justify a railway on the broad gauge. That Government also recommended that the section between Ahmedabad and Palanpur should be handed over to the BBCI Railway Company to be built under their guarantee.

The London Board of Directors of this railway company were also pressing their claims for extension northwards and objecting to any break of gauge but they were informed by the Secretary of State, Sir Charles Wood, that it was not intended to deviate from the policy under which it had been decided not to sanction the extension of that Company's lines with guaranteed capital, unless by the possible authorisation of short branches as feeders.

The Bombay newspapers had for many years past, given publicity to articles on the subject of the gauge, and had persistently cried down the metre gauge endeavouring to show that the adoption of any smaller gauge than 5' 6" was undesirable. Memorials on the subject also were frequent. In October 1875, the Bombay Government forwarded a memorial from certain bankers, traders etc., residing in Surat and Broach for the immediate construction of the railway from Ahmedabad to Ajmer, and expressing a hope that immediate sanction would be accorded to the section between Ahmedabad and Palanpur on the 5′ 6″ gauge.

In April 1877, the Bombay Government forwarded a memorial on the question of the gauge of the Western Rajputana Railway from the Ahmedabad Association and the inhabitants of Gujrat and Kathiawar. On 8 June 1877, the Bombay Chamber of Commerce memorialized the Secretary of State (Lord Salisbury) on the subject. On the 29th August 1877, the Sheriff of Bombay convened a public meeting of the inhabitants of Bombay to protest against the construction of the Rajputana Railway on the metre gauge.

The Secretary of State, in replying to the memorials from the inhabitants of Bombay, regretted that his decision was adverse to their wishes and added that "the selection of the metre gauge for line of railway in question was not made without careful consideration by Her Majesty's Government, as well as by the Government of India, of all the circumstances of the case ; and my conviction of its propriety remained unchanged." The question of gauge on the Rajputana system of Railway was thus set at rest ; works for the metre gauge prosecuted with vigour, and the line was opened throughout on 1 January 1881.

The gauge question agitated the minds of the builders of railways in India, the boards of the railway companies, government authorities in

India and England and the British Parliament for well over a quarter of a century. In the debate generated by this difficult problem, many contradictory, but nonetheless valid, opinions were expressed. Professional engineers were seldom in agreement and administrators generally non-committal. The Governor-General of India sought firm directions from the Secretary of State for India and the latter generally left the matter for decision by the Indian authorities. Considerations of commerce, trade, financial resources, technical feasibility and military strategy all figured in the long debate, one factor, for a while, gaining ascendency over the others, depending upon the approach of the participants and the turn of events.

Ultimately what clinched the issue was a combination of two major factors : military strategy and financial resources. For instance, the former determined that the trunk line from Karachi to Peshawar, parts of which had already been laid on metre gauge, should run all along its 1100 miles (1,771 km) length on broad gauge. After the laying of the first trunk lines in Bengal and Bombay presidencies, as the need for expanding the railway system to the hinterland and provision of feeder line arose, and the Government of India decided to build new lines at state expense rather than allow private companies to do so, the spreading of the limited resources thinly over a wide area, when there were other competitive demands such as roads and irrigation canals, assumed greater importance than the convenience of a uniform gauge. The economic factor really decided the issue. While the average costs per mile of broad gauge was Rs 1.66 lakhs, as calculated in 1880 that of metre gauge was less than half that figure, just Rs 70 thousand.

These were the circumstances under which the Indian sub-continent came to be burdened with a multi-gauge railway network. To blame those who laid the foundations of such a system, which has in the course of time, emerged as two separate countrywide systems, one broad gauge and the other metre gauge, is to ignore the inexorable facts of history which no human endeavour can ever escape.

Annexure 5-A

No. 23, dated 13 April, 1870
From the Secretary of State for India.
To The Government of India.

Copy Report on results of experiment of the Fairlie System on the Festiniog Railway; and Copy letter from Captain Tylee, to Board of Trade, dated 4 *March*, 1870

The papers enclosed herewith, and marginally noted, are reports on the experiments recently made on the Festiniog and Port Madoc 2 feet gauge Railway and the Mid-Wales 4 feet 8 inches gauge Railway with a description of locomotive commonly called the "Fairlie Engine," after Sir Robert Fairlie, the inventor and Patentee.

2. The experiments are instituted primarily for the satisfaction of a Russian Government Commission, headed by Court Alexis Bobrinskov which had been sent expressly to this country to witness them, but they were attended also by the Duke of Sutherland, by Major-General Sir William Baker, one of the Members of the Indian Council, by Mr Thornton and Mr Danvers of this office, Captain Tylee of the Board of Trade, and several other gentlemen interested in Railway construction and management.

3. The results were regarded as eminently satisfactory by all present, and may probably be deemed of special interest in India as exemplifying the capabilities of an unusually narrow gauge, even where steep gradients and sharp curves, such as would be quite inadmissible on a Railway of the standard gauge, are in use.

4. It may deserve the consideration of your Government whether these results do not indicate the suitableness to many parts of India of a mode of railway construction and working far less expensive than any previously suggested.

6

The Beginning of the State Enterprise

The First Phase : 1853-68

The construction and development of railways in India commenced in the middle of the nineteenth century. Between 1853, when the Great Indian Peninsula Railway Company opened a line from Bombay to Thana, and 1861, a number of railway lines were constructed by companies under contracts with the Government which guaranteed to them fixed interest on the capital invested by them. The main provisions of these contracts were that government will grant land free of cost ; the necessary capital should be raised by the companies ; the Government should guarantee interest on that capital at 5 per cent per annum in sterling ; any surplus profits earned by the railways in excess of the guaranteed interest, should be utilized to repay the government any sums by which they might have had previously to make good the guarantee of interest, the remainder belonging to the shareholders ; reservation of certain powers of control by government ; and option to the government to purchase the lines after 25 or 50 years.

The capital was raised mainly in England where an active Indian railway lobby had developed. As the terms were favourable to the investors, the Indian railways attracted a regular flow of money, and came to occupy a prominent place in the international capital market in the second half of the nineteenth century.

By 1868, which marked the conclusion of the first phase of the construction of railways in India under the 5 per cent guarantee, a total of nearly 70 million sterling had been invested by the British shareholders in the Indian railways and over 4,000 miles (6440 km) of the line had been opened to traffic. The accompanying table gives the total length of the railways built under the guarantee system, capital invested in each railway, cost per mile, amount of gross receipts required to produce a return of 5 per cent and more and the actual receipts. It will be seen that the actual receipts were close to the gross receipts required to produce a return of 5 per cent in case of the East Indian and the Eastern Bengal railways, almost double in case of the Great Indian Peninsula railway, and considerably short in case of the Madras, Bombay, Baroda and Central India, Punjab, Great Southern and Calcutta and South-Eastern railways.

The cheapest of these early guaranteed railways was the Great Southern of India. Whereas the BBCI cost £ 20,000 per mile, the GSI laid its line at less than £ 8,000. It traversed prosperous rice-growing lands and its only obstacles were small tributaries and irrigation canals. To avoid flooding, much of its length was built on a six-ft embankment. It opened in 1862 on 5′6″ gauge linking the east coast port of Negapatnam with the prosperous inland centre of Trichinopoly and then ran on to Erode, where it connected with the Madras Railway. In 1874, GSI was joined with the Carnatic Railway to form the South Indian Railway and was converted to metre gauge in 1875.

In 1862, 20-year subsidies, but not guarantee, were granted to the Indian Branch Railway Company, which planned to build feeder branches in North India, and to the Indian Tramway Company, which built a short branch near Madras. Neither could attract much capital. The Indian Tramway Company was, therefore, granted a 3 per cent guarantee but went into liquidation, emerging as the Carnatic Railway before being absorbed in the South Indian.

State Ownership

The direct ownership of railways by the State in India dates back to the 1st April 1868, when the Calcutta and South-Eastern Railway was surrendered to the Indian Government under the terms of contract between the Secretary of State and the Company, the reason for the transfer being that the line had been worked at a loss since its opening for traffic in 1862. In 1869, the Government first undertook the construction of railway lines departmentally and all lines in the next ten years were constructed in this

Table showing total length of undertakings, estimated cost, average cost per mile, amount of gross receipts, and average weekly receipts (prepared by Juland Danvers Esq.)

Railway	Total length of under-taking	Estimated ultimate cost when finished with a certain extent of Double Line	Average cost per mile when finished with a certain extent of Double Line	Amount of gross receipts per mile per week required (50 per cent being calculated for working & maintenance to produce						Average weekly receipts during 1865-66	
				5 per cent		6 per cent		7 per cent			
	Miles	£	£	£	s	£	s	£	s	£	s
East Indian, Main Line	1275 (2052.75 km)	28,000,000	22,000	42	6	50	15	59	0	39	0
Great Indian Peninsula	1266 (2038.26 km)	18,380,000	*14,510	27	18	33	10	39	0	55	5
Madras, South-West Line	492 (792.12 km)	5,904,000	12,000	23	0	27	13	32	6	14	0
Bombay and Barodah	312 (502.32 km)	7,488,000	24,000	46	3	55	3	64	12	13	8
Punjab	253 (407.33 km)	2,530,000	10,000	19	5	23	5	26	18	8	6
Eastern Bengal	160 (257.6 km)	2,720,000	17,000	32	13	39	12	45	15	28	7
Great Southern	160 (257.6 km)	1,600,000	10,000	19	5	23	5	26	18	8	10
Calcutta and South-Eastern	29 (46.69 km)	609,000	21,000	40	7	48	10	56	10	9	0

*It is certain that this rate will be much exceeded. A cost of £ 20,0001 per mile will probably be nearer the truth.

manner. By the year 1880, about 9,000 miles (14,490 km) of railway lines had been opened to traffic.

In the year following the surrender of the Calcutta and South-Eastern Railway, the scheme for railway extension in the Punjab, north of Lahore, which had been under preparation in a preliminary form for several years, was also definitely accepted by the Government of India as a State undertaking and a group of engineers acting under the orders of the Secretary of State arrived in India in the autumn, and commenced survey operations at once. This line was eventually called the Punjab Northern State Railway.

The first Administrative Report on Indian State Railways from their commencement to the end of 1879-80 was issued by the Government of India in 1881 from Calcutta. Its author Major-General J. S. Trevor, B. E. explained his objectives in the opening chapter, namely "General Remarks Concerning Construction and Working of State Railways." An excerpt from this chapter is reproduced as Annexure 6A.[2] The report on the State Railways were prepared according to their geographical location in the various provinces into which India was then distributed for administrative purposes, these being Punjab and Sind, North-Western Frontier, Rajputana and Central India, Bengal, Bombay, North-Western Provinces and Oudh, Central Provinces, Madras and Burma. Punjab and Sind, North Western Frontier and Burma provinces have been retained in the Annexure 6A in the interest of historical accuracy, though they no longer form part of India. Excluding these provinces, the mileage of State Railways in India stood at 2353.75 (3,798.54 km).

Rajputana and Central India

The Rajputana and Central India system of lines was projected to establish railway communication between Rajputana and the North-Western Provinces and Punjab, and to make a connection with the Bombay and Baroda Railway at Ahmedabad ; also eventually to connect Rajputana with Central India and the Great Indian Peninsula system of railways. Some surveys in connection with these projects were made by the Bombay and Baroda Railway Company in 1867 and 1868, but the first definite steps taken towards the attainment of the objects were commenced in 1869 by the Government of India during the viceroyalty of Lord Mayo.

When the Rajputana system of railways was first contemplated, it was thought that Sambar Lake salt would form the chief bulk of produce to be carried, and indeed the main object of making this line was to cheapen the

price of this salt in the markets situated in the Ganges Valley ; and that, as Rajputana generally, and also Central India supported but a sparse population, the railway traffic would be light ; consequently, it was determined to make these lines on the metre gauge. The ultimate completion of communication between the North-Western Provinces and Bombay was always held in view, but this was considered a far distant prospect ; the immediate object of distributing the salt manufactured at the Sambar Lake being the motive which caused surveys to be made southward from Delhi as far as Rewari, and shortly afterwards from Agra to the Sambar Lake westward of Jaipur. As portions of these lines were opened, traffic rapidly developed.

In 1870, the Maharaja of Holkar offered a contribution of a crore of rupees towards the construction of a line from a point on the GIP to Indore, the seat of his capital.[3] The offer was accepted by the Government of India and an alignment from Khandwa, across the Narmada and up the slopes of the Vindhyas, to Indore was selected.

In 1872 Maharaja Sindia offered a contribution in cash towards the construction of a railway, 75 miles (120.75 km) in length, between Agra and Gwalior, the capital of his dominions. Eventually it was decided to build this line on the 5′6″ gauge.

The country traversed by these lines of railway is partly mountainous, crossing both the Araveli and the Vindhya ranges of hills. The character of the soil is mostly sandy in Rajputana and black in the vicinity of the trap rocks of Central India. The rainfall varies greatly in different parts of the country, dependent upon the proximity to the hills. The rivers, which are numerous and important, but not very large, except the Narmada and the Chambal, have fairly well defined banks and are not liable to alter their course. The Narmada was crossed by the Holkar Railway below the base of the Vindhyas and required a very extensive bridge, more than half a mile long, with piers over 80 feet high. The Chambal had to be crossed twice, at a high level between Indore and Ratlam on the road to Nimuch (Neemuch) by the Sindia-Neemuch Railway, and again between Agra and Gwalior by the Sindia Railway. Near Gwalior, the Chambal became a grand river of more than half a mile width with a depth of considerably over 100 feet during the extreme flood.

A project from Indore to Nasirabad was surveyed in 1872 and construction between Indore and Nimuch was commenced in the following year. Some experiments were tried in brick-burning but turned out a failure owing to good brick earth being not available anywhere near the line. Stone was also not readily available, the nearest quarries being at Mungrole, eight miles south of Ratlam. A tramway had to be laid to this quarry.

At the Nimuch end, however, good stone was procurable. These handicaps explain the slow pace of construction. It took nearly ten years to complete the line from Khandwa to Nimuch. By the end of 1880, the entire length from Kandwa to Nimuch 243 miles (391.23 km) had been completed. It is interesting that the fencing of the line formed a part of the Sindia-Nimuch Railway construction.

The Holkar Railway, Sindia-Nimuch Railway and the Nimuch-Nasirabad railway were a continuation of the same line and the intention was that as soon as they had been linked with the Rajputana line at Ajmer, they would all form one system, under the title of Rajputana-Malwa Railway.

The Rajputana line connected Delhi with Bombay, its northern termini being at Delhi and Agra, where there were junctions with the East Indian Railway. Its southern terminus was at Sabarmati near Ahmedabad, where it effected a junction with the Bombay, Baroda and Central India Railway. The lines from Delhi and Agra met at Bandikui, 134 miles (215.74 km) from the former and 93 (149.73 km) from the latter. There was a junction with the Holkar and Sindia-Nimuch Railway at Ajmer. There was a short salt branch to the Sambhar Lake, leaving the main line at miles 184 (km 296) from Agra. Through communication with Bombay was established on 1st January 1881. The line was constructed for a single track, but sufficient land was taken for a double road.

Bengal

In 1863 a broad gauge line was constructed and opened for traffic by a private company under a Government guarantee between Calcutta and Port Canning, distance 28 miles (45 km) and was called the Calcutta and South-Eastern Railway. The cost of this line was heavy. It was made in anticipation of Port Canning attracting shipping and competing with the port of Calcutta ; but these anticipations were not realised, few ships called at Port Canning, notwithstanding the advantages offered, and in consequence of the dearth of sweet water and other causes the township had only a short existence as a port. The result was that after the railway had been opened for traffic, it did not pay its running expenses. In 1868 it was handed over, according to the terms of the agreement made at the time, to the Government of India. This was the first line which came under Stater ownership.

Nalhati

This short line meets the East Indian Railway at a point 145 miles (233.45 km) from Calcutta and runs to Azimganj. It was constructed on the 4 ft gauge by the Indian Branch Railway Company and opened for traffic in December 1863. It was bought by the State in March 1872. The line was laid on one-half of a metalled road with rails weighing 32 lbs per yard. The line acquired fame because it was the proud owner of 'Ramgotti,' now displayed at the Rail Transport Museum at New Delhi. This locomotive was built in France and remained in the service of the line from 1882 to 1896.

Northern Bengal

Omitting the broad gauge portion worked as part of the Eastern Bengal Railway, this line extended from the north bank of the Ganges to Siliguri at the foot of the Himalayas, from where a steam tramway was constructed to Darjeeling in 1880-81. This later on developed into the Darjeeling Himalayan Railway.

The North Bengal line was constructed for a single track, but sufficient land had been taken for a second line of rails. The first section consisted of 134 miles (215.74 km) between the Atrai river and Jalpaiguri and the main line was completed by the opening of the northern section in June 1878.

Tirhoot

With the exception of the short branch from Barh on the East Indian Railway, this line was located to the north of the Ganga. From Samastipur, 27 miles (43.47 km) from the river bank, there was a branch to the north-west, which was opened to Muzaffarpur, 32 miles (51.52 km), in February 1877. The main line continued from Samastipur to Darbhanga, 23 miles (37 km) which was finally opened for traffic in November 1875.

Patna-Gaya Railway

The important city of Gaya (Gya) was visited every year by a great stream of pilgrims to its holy temples. To maintain road communication, in these circumstances, was found by the Provincial Government of Bengal to be expensive, and hence arose the proposal for a railway, which was sanctioned and built in the years 1878 and 1879. The 5′ 6″ gauge was

adopted and the line was worked as a branch of the East Indian Railway from Bankipur, the civil station of Patna, 338 miles (544 km) from Culcutta.

Up to the end of March 1880 the Bengal system of railways had grown into :

		Miles
Northern Bengal	metre gauge	229½ (369.5 km)
	broad gauge	13 (20.93 km)
Tirhoot	metre gauge	82 (132 km)
	broad gauge	3 (4.83 km)
Patna-Gaya	broad gauge	57 (91.77 km)
Nalhati	4ft gauge	27¼ (43.87 km)
Calcutta and South-Eastern	broad gauge	28 (45 km)
	Total :	439-3/4 (708 km)

The metre gauge sections of the Northern Bengal and Tirhoot were described as narrow gauge in the official reports published in the 1880s.

Bombay Presidency-Patri Salt Branch

As Bombay Presidency was well served by the GIP and the BB&CI, not much need was felt for State enterprise. Only two lines were constructed by the State. The Patri Salt Branch was undertaken to encourage the salt industry of the Rann of Cutch and was constructed during the years 1871-73. It was 22½ miles (36.22 km) in length on the 5′ 6″ gauge and started from Viramgam (Verangaum) Station of the Bombay, Baroda and Central India Railway, 350 miles (563.50 km) from Bombay.

Dhond-Manmad Railway

This railway, 5′ 6″ gauge, 145 miles in length, connected the two main lines of the Great Indian Peninsula Railway above the Ghats between the stations of Dhond, on the south-eastern line, 167 miles (268.87 km) from Bombay, and Manmad on the north-eastern line towards Jabalpur, 162 miles (260.82 km) from Bombay. This chord line had been in contemplation for some years in order to avoid the necessity of goods passing from Central India and the North-Western Provinces, to South-Maratha and Madras, having to descend and ascend the two ghat inclines between Igatpuri and Poona. It was not, however, until the great famine in South India which occurred in 1877 that the full value of the line became apparent, and the great disadvantages of the heavy ghat inclines were fully recognized.

The earthwork of the line was then made by famine labour and the permanent way was laid as rapidly as possible to provide for the transport of famine grains traffic on the Great Indian Peninsula Railway. The line was opened permanently at the end of 1879 but the large bridges were not entirely finished until June 1880. In this year, the mileage open to traffic on State railways in Bombay Presidency was 167½ (296.67 km).

North-Western Provinces and Oudh

In the North-Western Provinces and Oudh, apart from the main lines of communication already established by the East Indian, Sind, Punjab, and Delhi, and Oudh and Rohilkhand Guaranteed Railway Companies, the extension of the railway system was carried out as a provincial undertaking, provincial funds guaranteeing interest up to the capital cost of the railways.

In two cases appeals to the local public contributed sufficient capital to supplement the grants of money by the Local Government to build short lines of railway between Mathura (Muttra) and Hathras (Hattras), and between Dildarnagar (Dildarnuggur) and Ghazipur (Ghazeepur). Progress was not rapid in the North-Western Provinces and Oudh in the extension of state or provincial railways, because these provinces possessed a comprehensive system of guaranteed railways, and portions of the Rajputana State Railway system and the Sindia Railway, were also available as provincial means of communication. The State lines built up to 1880 served to connect outlying centres of trade with the main lines of railway communication.

Mathura-Hathras

This line, which connected the left bank of the river Yamuna, opposite the town of Mathura (Muttra) with the East Indian Railway at a point 857 miles from Calcutta, was partly laid on a metalled road. The rails weighed just 30 pounds to the yard and were laid on wooden cross-sleepers chiefly of deodar. It was opened in October 1875. An extension of 24 miles (38.64 km) from Mathura to Achnera (Achneyra) on the Rajputana Railway with heavier metals was in the course of construction in 1880-81. It was opened on 7 November 1881.

Kanpur-Farukhabad

This line followed the right bank of Ganga and had to cross three streams of moderate dimensions, not involving heavy engineering works,

The construction of the line began in 1878 and it was opened in early 1881, from Kanpur (Cawnpore) on the East Indian Railway to Farukhabad, a distance of 86 miles (138.46 km) for the purpose of affording railway communications between these two important trade markets. Some money was subscribed locally for the construction of this railway, but not a large portion of the total capital that was required for its completion.

Dildarnagar-Ghazipur

This 12-mile (19.32 km) line upto Tari Ghat on the right bank of the Ganga opposite Ghazipur (Ghazeepur) started from Dildarnagar station on the East Indian Railway, 433 miles (597 km) from Calcutta ; it was built on the 5′ 6″ gauge and was intended to be worked by the East Indian Railway as a branch to serve the extensive trade of Ghazipur and also for the transport of the opium produced at the Government factory at that place. The works upon this line were unimportant. Funds were raised in a somewhat similar manner to those required for the Mathura-Hathras Railway. The line was commenced in 1878 and was opened in October 1880.

The lines under construction at the end of March 1880 were as follows:

	Miles	
Kanpur-Farukhabad, metre gauge	86	(138.46 km)
Ghazipur-Dildarnagar, 5′ 6″ gauge	12	(19.32 km)
Mathura-Hathras, metre gauge	29	(46.69 km)
Mathura-Achnera, metre gauge	24	(38.64 km)
Total	151	(243.11 km)

Central Provinces—Wardha Coal Railway

The first line started in the Central Province was the Wardha Valley Railway, which was undertaken to open out the coal mines at Warrora, as a means of affording a cheap supply of coal to the Great Indian Peninsula Railway. It was projected in the 1860's, but active steps to survey the country were not taken until 1870-71 and actual construction was not commenced until 1872-73. The line, 46 miles (74 km) long, started from Wardha (Wardah) station of Nagpur branch of the Great Indian Peninsula Railway, 472 miles from Bombay and was built on the 5′ 6″ gauge. The country passed through was in parts hilly and some of the streams crossed

were subject to flooding during the rains. The line was opened for traffic in sections and was completed in November 1877.

Nagpur-Chhattisgarh

This line, starting from Nagpur on the Great Indian Peninsula Railway passed through the cantonment of Kamptee and took a westerly direction. Built on metre gauge it was opened up to Tumsar, 53 miles (85.83 km) for goods traffic in April 1880 but could not be fully opened due to delay in the construction of passenger stock. It was opened to passenger traffic in November 1880.

Madras

No state line had been built in Madras Presidency till 1880, though a proposal had been made to construct a line from Mysore to Beypur on the western coast, as it was considered that "such a line would assist in the development of that part of the Empire."

Summing up

The change in policy from the system of guarantee to the construction of railways by the State was made by Lord Lawrence, Viceroy and Governor-General of India in 1869, on the ground that the obligation under the old system had been found burdensome. The wide extension of railways was looked upon as a necessity towards the development of the resources of India, but the financial state of the country demanded some cheaper system than the 5 per cent guarantee that had hitherto been given to private railway companies. Moreover, it was observed that the requirements of many of the districts into which it was proposed to extend railway communications would be amply served by lines of less capacity than those hitherto adopted. Thus it came about that the Government of India decided in future to make its own railways, either on the standard broad gauge or on a narrower one, according as the lines were trunk lines or of secondary importance. Lord Lawrence's contention that the future lines should, so far as was consistent with the agreements with private companies, be built by the State itself was accepted by the Government of India and in the 1970s, State enterprise was responsible for all extensions. These lines were financed by public borrowings and in some case by raising money from local bodies.

As the emphasis was on economy of construction, the majority of the State lines were constructed on metre gauge, which in 1880 was described as narrow gauge. Summing up the extent of State railway work finished and in course of construction, the following were the results.

The total mileage of railways completed and under construction in India up to 31 March 1880 was :

Province	Miles of Railways	Kilometres	Capital expended in lakhs of rupees
Punjab and Sindh	1,351¼	2175.5	1,10½
Rajputana and Central India	1,182¼	1903.42	798
Bengal	679¼	1094.40	365½
Bombay	167¼	269.67	111
North-Western Provinces and Oudh	152	244.72	35¾
Central Province	175¼	282.15	87½
British Burma	374½	602.94	124¾
Total :	4,082½	6572.80	2,633

It will be observed that the Punjab and Sind territories which became part of Pakistan in 1947, absorbed quite two fifths of the whole expenditure on State Railways ; this was accounted for, mainly, by the importance of the maintenance of proper communications in the strategically important North Western frontier of India.

In Rajputana and Central India communication was established on 30 March 1880 between Delhi and Agra and Haripur (Raipur) 50 miles (80.5 km) South-West of Ajmer, and also to Nasirabad. On the southern section of this system, a line was opened between Ahmedabad and Palanpur, 82 miles (132 km) to the north. The gap between Haripur and Palanpur of about 167 miles (268.87 km) still remained to complete communications between the North-Western Provinces and Punjab and the Bombay and Baroda Railway system at Ahmedabad. This was filled up on 1 January 1881.

Central India was supplied with railway communication as far as Ratlam and Jaora from Khandwa ; and the works beyond were so far advanced as to allow of opening into Nimuch (Neemuch) in June 1880. The connecting link, 134 miles (215.74 km) between Nimach and Nasirabad was

still needed, and on this section little had been done. Between Agra and Gwalior the works of the railway were well advanced, and opened for traffic in three sections, Agra Cantonment to Dhaulpur (Dholpur) in January 1878, Gwalior-Hetampur in December 1879 and Hetampur to Dhaulpur in May 1881.

In Bengal the State railway system had been well organized ; but much still remained to be done to provide for the needs of the extensive population inhabiting the fertile delta of the Ganga. In the North-Western Provinces and Oudh a beginning had been made with Provincial State railways. In the Central Provinces, the work of providing railways had been entered into earnestly.

During the first decade, some of the State railways such as Nalhati and Wardha Coal worked at a loss, but most of them made small profits, for the year 1880, ranging from 0.85 per cent on the capital cost on the Dhond-Manmad Railway to 6.56 per cent on the Patna-Gaya Railway, but these profits were much lower than those made by private companies ; for instance the East Indian Railway earned 8.71 per cent in 1880. Colonel W. S. Trevor, Director General of Railways, however, thought that the State railway system must not be judged from the results of its working apart from the working of those lines which were owned and managed by the guaranteed companies. The State undertakings were considered feeders of the trunk railways in India, and the net receipts from feeder lines, considered apart, gave but an insignificant indication of their real value. Since the construction of State railways assumed important dimensions in 1875, the total earnings of Indian Railways had risen from Rs. 820 lakhs per annum in 1875 to Rs. 1287 lakhs per annum in 1880 ; while the capital expenditure during the same period had not added to more than Rs. 26 crores.

Some of the expansion of traffic was no doubt attributable to the development of trade in the districts traversed by the trunk railways, but a very large share of the additional traffic had been drawn on to the railway system by the new lines opening out fresh country. In any case, what the Government had primarily to look for was that the continuing expenditure of capital on the railways should diminish, and not increase, the net annual charge for interest on the revenues of the State ; and, taking this as a cardinal condition, the reduction in the deficit between the net charge of interest on railway capital and the net railway income from Rs. 94 lakhs in 1875 to Rs. 31 lakhs in 1880 was proof positive that the State had not been a loser by the expense it had incurred in extending the Indian Railway system.

If the working of the State Railway system taken by itself, did not yet show direct profit, many circumstances had combined to delay its realization : a few of these are related here. In the Punjab and Sind the permanent lines were only opened for traffic on the commencement of the Afghan War. Since the opening of the permanent broad gauge line, exceedingly heavy war traffic overwhelmed the limited resources in stock and staff, forced Government to borrow equipment and men at ruinous cost.

In Rajputana the traffic did not come up to expectations. In Central India the heavy gradients on the Vindhya Ghat had increased materially the working expenses. The open lines of the Bengal system for several years consisted only of the Calcutta and South-Eastern Railway and the short Nalhati lines ; the former was notably sold to the Government because its original builders had despaired of success, and even of working the line to pay its current expenses ; the latter paying a good percentage (9.39) in 1879 on capital outlay.

In Bengal, boats competed with the railways, but the people were learning the advantage of the facilities afforded by the railway ; the rapid growth of trade on the Northern Bengal Railway fully justified this view. The Tirhoot line suffered by the bar imposed by the Ganga and the limited extent of the railway system north of the river, but the traffic did develop fairly fast.

In Bombay the construction of the Patri Branch had a specific object—the development of the salt trade ; this object had been gained ; the Dhond and Manmad railway had been completed only in 1878 and three years of working did not justify any conclusions being drawn regarding its financial prospects. The Muttra-Hattras line had paid its way almost from the first and its prospects were very encouraging. In the Central Provinces the Wardah Valley Railway was constructed for the limited objective of encouraging the coal industries of Warrora but the result had not been satisfactory owing to the difficulty experienced in working in the collieries.

NOTES AND REFERENCES

1. Railways of India - Davidson
2. Report by Railway Board on Indian Railways, 1879-80, published 1881.
3. Despatch No. 39 dated 9 June 1870 from the Secretary of State for India, London, to the Governor-General in Calcutta.

Annexure 6-A

(Exceprts from the Administrative Report on Indian State Railways up to 1879-80 *; published in* 1881

Quite ten years have now elapsed since State Railways were first started in India, and the accumulation of papers relating to them is very large ; it has been necessary, therefore distinctly to hold that the object in view in the preparation of this report is to elicit from these papers only useful information, but without discarding valuable matter, and to reduce the whole into moderate compass.

Ordinarily, in a railway administration report many points would be touched upon which will not now receive a place ; the success of individual officers in the construction and control of railways would, under ordinary circumstances, be recorded, but in the review of so long a period as ten years it has been found impossible to enter into such matters, as many of those who have worked will have left India and testimony concerning all is not forthcoming : hence, it has been considered best to eliminate all mention of individuals. This omission, however, must not, in any way, be held to cast discredit on those who have been engaged upon State Railways ; for in most cases the individual merits of officers have been already recognized, or have been recorded in other ways.

All mention of railway accidents has also been excluded partly because it would be useless to treat this subject in any way except exhaustively, thus rendering the report too bulky, and partly because detailed orders have been periodically passed on accident returns by the Government of India and a repetition of these orders would lead to no useful purpose.

The main object of this report is, therefore, to give a history of State railway construction ; to narrate briefly the difficulties met with and overcome ; and to record the salient features of the working results of the ines after they have been opened for traffic. So far as has been found practicable, bare facts only have been recorded, and all individual opinions, lexpressed in the papers from whence the information contained in this report has been derived, have been carefully excluded.

The subject of railway construction and administration has been treated under two heads—(1) Construction of lines, (2) Management of open lines.

On the 31 March, 1880, nearly 2,500 miles (4,025 km) of State Railways had been opened for public traffic, and about 1,500 miles (2,415 km) more were under survey and construction. The total sum

expended on the construction of Government Railways upto that date amounted to nearly 2,633 lakhs of rupees, exclusive of store balances, and the cost of lines constructed by Native States.

India affords a very wide field for observations during the construction of public works, and probably in no branch of the Public Works service can results be so useful as those gained in the construction of railways, which traverse widely separated countries, in which formidable physical obstacles are met with ; and in which soil, climate, and all circumstances connected with the completion of large engineering structure differ widely. Therefore, beginning with the construction of railways, it is advisable briefly to describe some of the most prominent features of the provinces through which State Railways have been, and are being, constructed. The railways system in India is still very far from complete ; much still remains to be done in many parts of the Empire ; a beginning only, in fact, has been made and State Railways form but a very small portion of the work ; consequently, in some provinces the observation which have been recorded are very limited in extent.

The State railway system, as at present in process of development, is divided amongst the several provinces of the Empire as follows :—

	Miles	*Kilometres*
(1) Punjab and Sind, North Western Frontier	1,351¼	2175.5
(2) Rajputana and Central India	1,182¼	1908.43
(3) Bengal	679¾	1094.39
(4) Bombay	167½	269.72
(5) North-Western Provinces and Oudh	152	244.72
(6) Central Provinces	175½	282.15
(7) Madras	...	...
(8) British Burma	374½	602.94
	4082½	**6572.82**
(9) Lines in Native States		

	Miles	*Kilometres*
Hyderabad	121	194.81
Hyderabad Assigned Districts	14	22.54
Kathiawar	193	310.87
Bhopal	67	107.87
Mysore	88½	142.48
The Gaekwar's	58½	94.18 km
	542	872.62 km
	4624½	**7445.44** km

Author's Notes

(1) The total mileage as stated in the Report is 5,365.50, possibly due to a printing error.

(2) Punjab and Sind, North-Western Frontier and Burma provinces have been retained in Annexure 6-A in the interest of historical accuracy, though they no longer form part of India. Excluding these provinces, the mileage of State Railways in India stood at 2,353.75 in 1881.

(3) The Assigned Districts in Hyderabad State include the two branch lines in the Berars.


THE INDIAN RAILWAYS, 1873.
THE
RAILWAYS
OF
INDIA
Statute Miles
Railways & Stations
Proposed & in Progress
The territory under British administration is coloured Red
Native
Yellow
AFGHANISTAN
CHINESE EMPIRE
TIBET
NEPAL
BHOTAN
RAJPOOTANA
CENTRAL
PROVINCES
BERAR
HYDERABAD
MYSORE
LOWER
PROVINCES
Bundelcund
BOMBAY
CALCUTTA
MADRAS
MANDELAY
Hyderabad
Bangalore
Pondicherry
Nellore
Kurnool
Poona
Kelat
Lassa
Gulf of Cutch
Gulf of Cambay
BAY OF BENGAL
ARABIAN SEA
INDIAN OCEAN
CEYLON
Andaman Is.

7

The Railways in Princely States

The following lines were projected on 31 March 1880; some being already open for traffic, some in process of construction and some under survey :

	Gauge	Miles
Hyderabad (Deccan)—		
The Nizam's Railway	5′ 6″	121
Hyderabad Assigned Districts—		
The Berars Branches	5′ 6″	14
Kathiawar	3′ $3^3/_8$″	193
Bhopal	5′ 6″	67
Mysore	3′ $3^3/_8$″	86
	5′ 6″	$2\frac{1}{2}$
The Gaekwar's Railway	2′ 6″	$58\frac{3}{4}$
Total :		$542\frac{1}{4}$ (873 km)

Nizam's Railway

The Nizam Railway formed a juncion with the Great Indian Peninsula Railway at Wadi on the south-eastern line, 376 miles (605.36 km) from Bombay. Its total length was 121 miles (194.81 km)—$115\frac{1}{4}$ miles to Hyderabad, with a branch of $5\frac{3}{4}$ miles to Secunderabad. The Government of the Nizam provided the capital and the Government of India constructed the line. The route selected for the line presented no great engineering difficulties, and even up the Ghats the railway was carried by a series of stiff, though not severe, gradients. Surveys were commenced towards the close of

1869, but orders for the construction of the line were not given until the commencement of 1871. The line was completed and opened for traffic in October 1874. Upto the end of 1878, the Nizam's Railway was worked by the GIP Railway Company, and afterwards it was managed by the State agency up to the end of 1884. From January 1885, its management was taken over by the Nizam's Guaranteed State Railway company, incorporated in London.

The company was formed for the purpose of acquiring and working the then existing line of 119¼ miles (192 km) and constructing on the same gauge and working the new line, 375 miles (603.75 km) in length. Of this 332¼ miles, which included Wadi—Warangal, 202 miles, Warangal—Dorankal, 52¾ miles, Dorankal to the Frontier of the Nizam's State, 55¼ miles, Dorankal to Singareni coalfields, 16¼ miles, and some short branch lines, had been completed by February 1889. The Government of the Nizam provided part of the capital and the British Government built the line. Interest in sterling at 5 per cent on the company's share of 2 million sterling and debentures 1.5 million sterling was guaranteed.

Mysore Railway

In Mysore a line between Bangalore and Mysore was projected in 1870, but the intention to construct this railway was abandoned after surveys had been completed, and the project was only revived during the famine year 1877-78, when some of the earthwork was carried out by famine labour. In 1879 it was finally decided to construct the railway, and works were commenced.

The line was constructed on the 5′ 6″ gauge between the terminal of the Bangalore Branch, Madras Railway, and city of Bangalore, a distance of 2½ miles; from there to Mysore, 86 miles (138.46 km), the metre gauge was adopted. The country traversed was hilly and a considerable extent of drainage had to be crossed.

The object of the railway was mainly to link the capital of Mysore with the Madras system. The line was finally opened in February, 1882. Further extensions were made from Bangalore to Harihar, the frontier of the then Mysore State, between 1884 and 1889, making a total mileage of 296 (476.55 km) on the metre gauge. The section Mysore to Nanjangud, 15 miles, was built in 1891, but the short length of less than a mile from Nanjangud to Nanjangud Town was added in 1899. All funds for capital expenditure were provided by the Mysore Darbar and the lines were worked under a contract dated 31 August 1887, between the Secretary of State for India and the former Southern Marhatta Company Railway.

Kathiawar Railways

Proposals were first made in 1869 for the construction of railways in Kathiawar, and some suggestions were made that a line from Gogha to Gondal should be constructed by private enterprise. By 1872, the B. B. & C. I. Railway had connected Wadhwan with Ahmedabad on the broad gauge. The Viramgam-Wadhwan section was first opened on the broad gauge in May, 1872 and converted to metre gauge in December 1902.

On 17 February 1873 the Bhavnagar State wrote to the Government of India about its desire of financing the B. B. & C. I. Railway Company for constructing a line between Wadhwan to Bhavnagar. The proposal was rejected by the railway company. Bhavnagar State then proposed a line from Bhavnagar to Botad via Ningala, Umbrela and Sihor. This project was approved by the Government of India in 1875.

On 18 August 1877 Sir Richard Temple, Governor of Bombay summoned a meeting of the British Political Agent in Gujarat, the Agent of the B. B. & C. I. Railway company and Bhavnagar State Minister Shri Gauri Shankar. In the meeting, Bhavnagar State Railway was approved and the state offered Rs. 55 lakhs to the Government as capital for the Railway project which was to be taken up as a famine relief work. In November 1877, Sir Richard Temple visited Bhavnagar and asked the state not to expect a guarantee on the capital. This was not liked by the state and henceforth the project remained in doldrums.

On 6 April 1878 Maharaja Takhat Singh succeeded at Bhavnagar and within three days of his succession, accepted the advice of Sir James Piele, the Political Agent, about constructing a Narrow Gauge Railway line from Bhavnagar to Wadhwan. The Gondal State also agreed to join the project. The draft plan approved by the Government on 8 June 1878 on the condition that the Railway would be on the metre gauge.

In March 1879, the earthwork began on Bhavnagar-Gondal Railway. In 13 months, 105 miles (169 km) of railway was constructed with 16 intervening stations, out of which the last 54 miles (86.94 km) were constructed in 33 days. The inaugural ceremony of "Bhavnagar—Gondal Railway" was performed on 18 December 1880 by the Governor of Bombay as the first railway in Saurashtra. On 20 December, the line was completely opened up to Wadhwan, thus connecting Saurashtra with Bombay by railway. On 19 January 1881, Dhola—Dhasa section was opened and two days later, Gondal State also opened Dhosa—Dhoraji Section of 73 miles (117.5 km) with 12 intervening stations. The line had many diversions since the bridges were yet to be erected.

In 1883 Morvi States proposed a line from Wadhwan to Rajkot on narrow gauge with a branch line from Wankaner to Morvi. In 1887 the

State opened its first section from Wadhwan to Wankaner. The line was later converted to metre gauge in June, 1924.

There was a race among the native princes of Kathiawar, also described as Kattywar in some publications, for rail construction. In March 1887, Morvi State connected its capital with Wankaner, by means of a line on 2 ft 6 in. gauge. (This was converted to metre gauge in 1905). As Wankaner had already been linked with Wadhwan a year earlier, the new line joined Morvi State with Bombay via Wadhwan by rail. The extension to Rajkot was completed and opened to traffic in 1890.

On 29 December 1887, Lord Reay, the Governor of Bombay, cut the first sod for the Dhoraji—Porbander Railway of Gondal State. This event enhanced the image of Gondal State and it was admitted to the ranks of Class I States, raising the gun salute of its ruler from 9 to 11. On 1 September 1888, the Junagadh—Jetalsar Railway was opened also on metre gauge, followed by the Junagadh—Veraval Docks Railway on 1 February 1889.

On 1 October 1889, the Gondal State opened the Dhoraji-Jam Jodhpur section while the Porbander state inaugurated the Jam Jodhpur-Porbander Railway. The following year, this state extended the line to the port of Porbander.

On 12 April 1893, Jetalsar-Rajkot Railway was opened jointly by Junagadh, Gondal, Rajkot and Jetalsar States. Thus step by step a network was created, which was a remarkable example of cooperation among the princely states to develop rail communications in Saurashtra. The whole system was worked by a Board of Control, consisting of one nominee of the Government of India, to be President and one nominee from each of the owning states of Bhavnagar, Gondal, Junagadh and Porbander States.

In 1893-94, the Morvi State opened tramways on the narrow gauge on Morvi-Morvi City and Dahinsara—Navlakhi sections. These were opened and closed from time to time, but had to comply with the provisions of the Indian Railways Act of 1890.

The Jamnagar State inaugurated Jamnagar-Rajkot and Jamnagar-Bedi Bunder Railways, a total of 54 miles (87 km) on the metre gauge in April 1897. This was followed by the Dharangadhra State who opened a 21 mile (33.8 km) railway from Wadhwan to Dharangadhra. This metre gauge line was also worked by joint administration of Bhavnagar, Gondal, Junagadh and Porbander states. This administration had a total of 455 miles (733.55 km) under its control at the close of the eighteenth century.

The Gaekwar's Railway

The Gaekwar's Railway was built on narrow gauge (2½ feet) and

started from Miyagam, 229 miles (368.69 km) from Bombay, on the Bombay Baroda and Central India Railway. It was intended to benefit the districts in the vicinity of Baroda and afford railway communication to Dabhoi and Chandod. The line was commenced in 1872 and was opened for traffic up to Dabhoi in 1873. Extensions of the system were made and opened for traffic to Chandod and Bahadurpur in 1879. The management and working of this line were entrusted to the B. B. & C. I. Railway Company.

The Gaekwar's Railway was built on all the three gauges in different parts of the Baroda state and these were known as Gaekwar's Dabhoi, Mehsana and Petlad, which are described below :

The Gaekwar's Dabhoi

Date of opening for public traffic

Gauge 2′ 6″

Miyagam to Dabhoi	8-4-1873	20 miles
Dabhoi to Chandod	15-4-1879	$10\frac{3}{4}$,,
Dabhoi to Bahadarpur	17-9-1879	$9\frac{1}{2}$,,
Dabhoi to Goya Gate	1-7-1880	17 ,,
Goya Gate to Vishvamitri	24-1-1881	$1\frac{1}{2}$,,
Bahadarpur to Bodeli	16-6-1890	13 ,,
Total Open Mileage		71-$\frac{3}{4}$,,

Remarks

The dates of order of survey and construction were as follows

	Dates for survey	Dates for construction.
Mayagram to Dabhoi	17.4.1869	21-3-72
Dabhoi to Chandod and Bahadarpur	6.6.1877	27-11-77

The entire line was the property of His Highness the Gaekwar of Baroda, but was worked and maintained by the Bombay, Baroda and Central India Railway Company. The opening of this line aroused much public interest as will be seen from the following news item :

From : The Times of India, Thursday, 22 April 1880 :"The direct railway line connecting the Gaekwar's capital with Dabhoi will, it is expected, be opened for passengers and traffic on 1 May. At present the passengers have to go somewhat out of the way to the Baroda Railway station of Miagam, and thence take rail to Dabhoi, but the direct line now constructed will land them at Dabhoi, and at the same time cause a saving in distance of about twenty miles.

This branch line will develop further commercial facilities, and open up a portion of this Gaekwari territory, which is unusually rich in its resources. Dabhoi and the intermediate stations on the branch line are the centres of the rich cotton fields of Baroda. This part of the country also abounds in timber and mohuwa, the latter article being largely used in the manufacture of country liquor. On the line is situated the important station of Chanode, one of the holy seats to which Hindu pilgrims resort on every full moon. From Dabhoi the line will be extended to Saughur, where the stone in the numerous quarries is superior in some respects to Porebunder stone and this extension should enable the Gaekwari administration to utilize the Saughur stone in building the new palace, "The Lakshmi Villas" or the "Home of Prosperity", at much less cost than the present estimate."...........

The Gaekwar's Mehsana

Gauge (metre gauge).
Dates of opening for public traffic from Viramgam to Kheralu......from 1888 to 1891

Total Mileage......68 miles (109.48 km)

The survey of the line from Mehsana to Vadnagar was commenced in May 1881 and construction in August 1886. In March 1887 the line was completed by the Bombay, Baroda and Central Indian Railway Company, who were also entrusted with its working. Viramgam to Mehsana was opened in 1890.

The Gaekwar's Petlad

Gauge— (broad gauge)
Date of opening for public traffic from
Anand to Petlad......1890
Petlad to Tarapur... 1901

Total mileage...21½ (34.6 km)

The orders for the survey of this line were given in December 1887. Construction of Anand-Petlad was sanctioned in December, 1888 ; work commenced in January 1889 and was completed in 5 May, 1890. The cost was defrayed by His Highness the Gaekwar and the line was worked and maintained by the Bombay, Baroda and Central India Railway Company.

Jodhpur-Bikaner System (metre gauge)

This line from Marwar Junction to Luni Junction, 44 miles (70.84 km) and from Luni Junction to Jodhpur, 20 miles (32 km), was built on metre gauge and opened to traffic between 1882 and 1885. An extension from Luni Junction to Pachpadra, 60 miles (96.6 km) was laid and opened to traffic in 1887.

Further additions were made to extend the railway from Jodhpur to Merta Road, 64 miles (103 km), in 1891, and Merta Road to Kuchaman Road, 73 miles (117.5 km), in 1899. From Merta Road was also built a line in a northernly direction to Nagaur, a distance of 35 miles (56.3 km) and onwards to the border of Jodhpur state, another 24 miles (38.6 km), in 1891.

An extension to the west was built from Balotra to Barmer, 60 miles (96.6 km), in 1895, and five years later this line advanced another 74 miles (119 km), to Khokar Par into Hyderabad territory, now a part of Pakistan. The Jodhpur section added up to 455 miles (732.5 km).

The Bikaner section, consisting of 157 miles (252.77 km), was in part a continuation of the line from Merta Road up to Bikaner, completed in 1891, and from Bikaner to Suratgarh, which was completed between 1898 and 1901.

The Jodhpur-Bikaner system was the exclusive property of the two Durbars, each state receiving all the profits of its respective portion. On the greater length of the system, ballast consisted of coarse sand and small gravel. As the works were light, the system was built cheaply ; for instance, on à good part of its length jungle-wood sleepers were laid.

Bhopal-Itarsi

This 57-mile line (91.77 km), on the broad gauge, was financed partly by the British Government and partly by the Begum of Bhopal and was opened between 1882 and 1884. It was worked by the Indian Midland Railway Company, which was absorbed in the Great Indian Peninsula Railway in 1900.

Rajpura-Bhatinda

The first line built in the Punjab by a princely state was between Rajpura and Patiala, opened to traffic on 1 November 1884, and extended to Bhatinda, five years later, on 13 October 1889. This 108-mile (173.88 km) long line built on 5′ 6″ gauge, was the property of the Patiala Durbar but managed and worked by the Government through the agency of the North Western Railway. The land for the original construction was pro-

vided free of cost by the Patiala Durbar. For the purpose of working, the North Western Railway made it a part of its system in 1889.

Kolhapur Railway (metre gauge)

This 29 mile (46.69 km), line was the property of the Kolhapur state who provided the capital and was opened to traffic in April 1891. It was worked by the Southern Mahratta Railway.

Palanpur-Deesa Railway (metre gauge)

A short branch line of 17 miles (27.37 km), it was owned jointly by the Government of India and the Palanpur Durbar, who both contributed to its capital cost. Opened in November 1893, its working was entrusted to the Bombay Baroda and Central India Railway Company.

Rajpipla Railway (narrow gauge)

This 37-mile line (59.57 km), from Anklesvar, situated on the Bombay Ahmedabad line, to Nandod, was opened between July 1897 and July 1899. It was the property of the Rajpipla state and worked by the Bombay Baroda and Central India Railway company. The line was laid with $41\frac{1}{4}$ lb iron rails on half-round jungle teak sleepers.

Working Conditions

Generally, the terms of working of the lines that were owned by the Princely States and worked by private railway companies provided that the working expenses of the system were divided between the lines and the company comprising the system in proportion to their gross earnings. In some cases, the company retained an additional one per cent of the gross earnings as a contribution to the system's provident fund for the employees. These terms were quite fair. There were some exceptions to this general practice; for instance, in a few cases, the company charged the actual expenses for working a line, or a fixed percentage of the gross earnings, generally 50 per cent, or in proportion to the assumed capital invested by a Durbar. These exceptions could be unfair to the owning Princely States, as it was difficult to determine accurately the actual working expenses and the gross earnings, or the cost of the land which formed a part of the capital and was given free.

The agreements were generally current for a specified period and could be terminated by either party by giving notice of one year or six

months. Rates and fares generally conformed to those in force on the system, with a provision in some cases, as in that of the Gaekwar's Railway that these had to be fixed with the approval of the Ruler.

Some historians have placed the Holkar State Railway (Khandwa to Indore) and the Sindia-Neemuch State Railway (Indore to Neemuch) in the category of lines owned by Princely States, but they were not on the same footing as the lines described above in this chapter. For example, the Nizam's Government provided the whole of the capital required, about one million sterling, for the Nizam Railway. But in the case of the Holkar Railway, the Maharaja lent to the Government of India a sum of Rs. 100 lakhs, at $4\frac{1}{2}\%$ per annum for the construction of a railway line from Indore to Neemuch and a branch from Fatehabad to Ujjain on metre gauge. "The intrinsic importance of the line," said the Government of India, "is so great and the political advantage to be secured by the arrangement proposed so manifest, that we have not hesitated to give our assent to the Maharaja's terms, and to undertake to proceed at once with the construction of the line, accepting the liability of finding the sum, whatever it may be necessary for completing the junction between Indore and the Great Indian Peninsula Railway."

8

1880-81: A Watershed

In more than one respect, the year 1880 marked a watershed in the development of the Indian Railways. First, the State enterprise had made an impressive start and about 3,000 miles (4,830 km) of the railways had been built by the Government of India. Second, Princely States, then described as Native States, had taken the initiative in laying their own lines, at their own expense. Third, the Government of India exercised on 31 December 1879 its right to purchase the East Indian Railway, after the expiry of its contract with the E.I.R. Company which had according to the original terms, run for twenty-five years, and entered into a fresh contract with the same company. Fourth, the occurrence of severe famines in several parts of the country in the 1870's and the recommendations of the Famine Commission, led to some re-thinking on the subject of railway construction by the State, and Government gave serious thought to enlisting the support of private companies for a rapid expansion of the railway network in India. Fifth, the concept of a Railway Conference, precursor to the Indiàn Railways Conference Association, to tackle problems of common concern and to bring about some kind of uniformity in the handling of traffic, was firmly established. Sixth, some new features relating to personnel matters, namely, arrangements for the training of Indians, the institution of a provident fund and setting up of schools for the education of the children of railwaymen, were introduced.

New Contract with the East Indian Railway Company

On 31 December, 1879, the Secretary of State for India exercised his right under the purchase clause of the contract with the East Indian Railway Company and purchased the East Indian Railway at the expiry

of the first term of 25 years. But it was never the intention of the State to work the line itself ; so arrangements were made by which the original company should continue the working and management of the E.I.R., it being understood that the company would still hold a direct interest in its economical management. The new contract giving effect to these arrangements came into force on 1 January 1880 ; and the purchase of the line was thus effected without any hitch in its working and without causing any alterations in its personnel.

The State accepted each original £ 100 share at a value of £ 125 and converted the shares into terminable annuities. As however, the original shares were largely held by trustees on behalf of different trusts, the option was given of accepting the annuity or transferring the amount into East India Company 4 per cent paper. This latter alternative was largely availed of.

The principal provisions of this new contract were that the management of the line was to remain with the Company, the Government having full control over its working. Regarding receipts and expenses, after ordinary working expenses, the first charges on the general receipts were : (1) a sum not exceeding one lakh of rupees per annum for State control ; (2) the interest on debenture stock ; (3) payment of the annuity ; (4) interest on new capital ; (5) interest on the total value of stores in hand ; and (6) payments to the provident institution. Of the remainder, Government was to take four-fifths and the Company one-fifth, the latter being its remuneration for working the line. Also all expenditure on the acquisition of land was in future to be added to the capital account. Further, Government had the power to require the Company to give running powers for the locomotives and rolling stock of State and Guaranteed Lines, or to construct and work any branch railway connected with the undertaking. Excerpts of the important provisions of the contract are reproduced in Annexure 8 A.

In view of the special status that the East Indian Railway had acquired under the new contract, it will not henceforth be bunched with the other Guaranteed Companies, but will be shown as a distinct entity, wherever appropriate to the context.

Modification of Other Contracts

In respect of the Great Indian Peninsula, the Bombay, Baroda and Central India Railway, and the Madras Railway Companies, the Government of India relinquished the right of purchase of these guaranteed railways at the end of the first 25 years of the terms of the contract, on the acceptance by the Companies of the proposed modification of the

contracts whereby the debt then due to the Government for advances of the guaranteed interest was cancelled and surplus profits for the remainder of the lease were to be divided equally between the Government and the Company.

The new arrangement with the E.I.R., G.I.P. and Madras Railway Companies was not in the interest of India ; as outright purchase and management by the Government of India, when the companies had been making profits would have been beneficial to Indian revenues. The Government of India made a belated protest against the new agreements entered into by the Secretary of State to the deteriment of the interest of the Indian tax payer, but it was of no avail.

An interesting development was the tidying up of the position of the directors of the private railway companies vis-a-vis assets of such companies. There had been much criticism of the wealth amassed by some officers of the East India Company by taking advantage of the vast powers they enjoyed and the absence of tight control over their handling of the Company's affairs. The Secretary of State for India, therefore, took the precaution of advising the Governor-General that Directors of railway companies were barred from holding any pecuniary interest in a company for which they were responsible.

In 1880, the Commissioners of Kumaon and Rohilkhand were appointed Directors of Bareilly-Ranibagh Light Railway, while they also held shares in this Company. India Office did not approve of this arrangement and the Secretary of State requested the Governor-General that the Commissioners should divest themselves of all personal interest in the Company, if they were to continue as Directors.

Comparison with England

At the end of 1880, the total length of railway lines open to traffic in India was 9,325 miles (15,013 km).

		Miles
State Lines	...	2,931¾
Native States	...	296¾
East Indian Railway	...	1,504¼
Guaranteed lines	...	4,592¼
	Total :	9,325 (15,013 km)

The magnitude of this system can best be appreciated by comparing it with the total mileage of railways open to traffic in England and Wales. On 31 December 1879, this amounted to 12,547 miles (20,200 km.).

A comparison of the financial results of railway working in England and in India shows very favourably for the capital raised for the construction of railways in this country. While the net receipts in the United Kingdom amounted to 3.95 per cent of the capital, in India the figure realized was 4.68 per cent.[1]

Of the net receipts, the State Railways contributed one-ninth, the Guaranteed Railways eight-ninths : the open mileage of State Railways being about 3,000 miles (4,830 km), and that of the Guaranteed Railways about 6,000 miles (9,660 km). While comparing the financial results of State Railways with those of the old Guaranteed lines, it is worth noting that so different were the ratios of traffic receipts to working expenses on different railways, that rates which would have yielded a handsome profit on, say, the East Indian Railway—a line favoured by cheap coal, easy gradients, and a well-balanced traffic—would be unremunerative on State lines like the Punjab Northern or the Dhond Manmad Railway, where coal was dear and the traffic mostly one way.

Handicaps of State Lines

In drawing any comparisons, apparent anomalies could be explained by a consideration of the following points. First, main thoroughfares and the best openings for traffic had been already occupied by the Guaranteed Railways, and these had consequently a greater chance of financial success than the State Railways, some of which had been constructed for purely political or military reasons, or as famine works. Second, the State lines were in their infancy in the 1880s ; they had not had time to consolidate or settle down to their working so as to obtain the best possible results, nor had the traffic been fully developed. A retrospect of the old Guaranteed lines in the earlier stages of their management will show that they too, had been in existence many years before traffic developed or satisfactory results were obtained. Third, the rapid expansion of State lines had rendered it a matter of difficulty to get together and train a thoroughly efficient staff for their working. The difficulty of obtaining men from England was considerable and those who were drawn from that source had much to learn to suit the different conditions in India. Also, the number of men with railway background available locally was not large and only a small percentage of them were found suitable ; consequently on the opening of any new lines the staff had practically to be taught the duties required of them. Fourthly many of the State lines were unfavourably placed as regards fuel and cost of labour ; and the traffic offering was fitful and very unequally balanced as regards the proportion of up and down traffic. On the East Indian Railway, for example, coal cost less than Rs. 3 a ton ; on the Punjab

Northern it was over Rs. 30 a ton ; and the average daily wage of workmen in North-West India was 82 per cent higher than in Lower Bengal.

Such were some of the factors that had to be reckoned with while drawing comparison among lines constructed in a vast country like India, the different parts of which varied so strikingly in almost all aspects ; and even when allowance was made for these factors, it had to be remembered that the life of the younger State Railways had not been long enough for their financial results to give a tangible guide as to what their future prospects would be. All the same, there were misgivings in the mind of the Government of India and the Secretary of State whether future construction of railways should be entirely supported by State capital, or private capital should play its part.

Between 1st January 1880 and 1 January 1881, 838 miles (1,249 km) of railway were opened for traffic, and another 232 miles (373.52 km) by 31 March 1881 ; 72 miles (116 km) on the Punjab Northern were opened a few days after the close of the official year, thus making a total of 1,142 miles (1838.62) opened in about fifteen months. With the exception of $21\frac{3}{4}$ miles on the South Indian Railway, the whole of this mileage was constructed by State agency. Though the bulk of it was built in territories which were separated from India in 1947 and earlier, these figures give a fair idea of the speed at which State lines were being laid.

Re-introduction of Private Enterprise

The scheme for developing the expansion of Railways in India by enlisting private enterprise differed from the old guarantee system which was condemned by Lord Lawrence (Governor-General of India 1864-68) and Lord Mayo (Governor-General of India 1869-71), in giving the shareholders more direct responsibility in the economical construction and working of the line, by providing that if the concern should prove to be a financial failure, the loss should be shared by the shareholders. Under the old system the shareholders were so well secured by the Government guarantee as to have little practical interest in the economical management of the lines.

This departure in the policy of railway construction of India received the approval of the Secretary of State, and the Marquis of Hartington, in a despatch (No. 1 of 1881 Financial) drew attention to the importance,

> In the case of Railway... of ensuring their construction, whenever possible, by private capital, either local or European. It is true that up to the present time no Companies have been found willing to undertake the construction of Railways without a Government guarantee ; but......when any reasonable, prospect of success presents

itself, an endeavour should be made to encourage the raising of capital, through private agency on the exclusive security of the success of the undertaking.........

In the event of its becoming apparent that the due execution of this policy is impracticable, it may become desirable to consider whether a modified system of guarantee might not be advantageously adopted. By a modified system, I mean one so restricted in respect to time and to the rate of interest guaranteed as to give subscribers a real interest in the efficient and economical administration of the Railway.

Assisted Companies

In the case of the Calcutta-Jessore Railway, the construction of which had been undertaken by the Bengal Central Railway Company, the duration of the Government guarantee of 4 per cent, was limited to five years, and it was provided that the money so advanced was to be repaid from half the net earnings of the undertaking in excess of 5 per cent on the paid-up capital. Government reserved to itself the right of purchasing the undertaking on favourable terms after thirty years. The Bengal Central was designated as an Assisted Company. Also in the same category was the Darjeeling-Himalayan Railway, the first hill railway to come on the map of India. By 1880, 30 miles (48.3 km) of this line had been opened to traffic.

It was understood that the Bengal Central Railway Company was started under the auspices of Messrs Rothschilds and Messrs Barings—two firms of world-wide financial repute—and this fact had no doubt given a stimulus to private enterprise. It was hoped that in future negotiations it would be found practicable to eliminate the question of any Government guarantee altogether, and to limit the State aid to grants of Government land or mining rights, or other similar concessions. But the subject of railway construction by private enterprise was still beset with difficulties. Capitalists in England had become so accustomed to consider a Government guarantee on Indian investments as a *sine qua non*, that it was difficult to float an undertaking without State aid given in that form.

On an earlier occasion, in connection with the contract with the Indian Branch Railway Company, the Secretary of State had defined the terms to be offered for promotion of new ventures. These terms included a mileage subsidy and the grant in certain cases of further pecuniary assistance. In the instance of the Indian Branch Railway Company such extra assistance was confined to the case of bridges, the original estimated cost of which might exceed £ 10,000 each. These were considered by the

Government of India to be work quite beyond the ordinary cost of construction, and it is only for works of a very exceptional character that Her Majesty's Government was disposed to sanction an additional grant.

Quite a large number of companies who did succeed in raising their capital from equity and debentures, were subsidised by the Government of India, the provincial governments and local bodies such as the district boards, in order to enable the companies to pay a reasonable dividend to their shareholders. Among these were the Bengal Doars (3ft $3^3/_8$ ins), Shahdara-Saharanpur (2 ft 6 ins), Howrah-Amta (2 ft).

The subsidies took different forms. The typical cases were free grant of land, free use of district roads, and cash subsidies for a number of years, to make up specified dividend, the subsidising authority receiving half the share of surplus profits when these accrued in excess of the specified dividend, with powers to acquire a line after the expiry of a certain number of years. The expansion of the Indian railways network on subsidy terms continued during the twentieth century.

The Railway Conference

As far back as September 1876, it had been decided that in erder to facilitate the efficient working of the railways in India, a Railway Conference should be held, at which delegates of Guaranteed and State lines should take part and frame such general rules as would form a basis towards smooth working, and simplification of the daily routine, and better service to the public.

The rules for the interchange of rolling stock, as they stood, entailed considerable incovenience to the public, and in times of brisk traffic were the cause of much friction between the companies. Certain rules were, therefore, passed by this Conference ensuring free and unrestricted interchange of stock between all broad gauge lines at all season of the year ; and arrangements were made for the compilation of a new set of General Rules and Regulations, which would be required under the new Railway Act (which became Act IV of 1879) and which should be applicable to the working of all the railways in India.

An important recommendation was that when continuous brakes are introduced on Indian Railways, a uniform system should be adopted on all the lines, in order that vehicles belonging to different railways might continue to be easily interchangeable and run through from end to end of the several trunk routes, thus avoiding the inconvenience, insecurity, and expense that were being experienced on the British Railways owing to the many different kinds of continuous brakes that were in use on lines connecting with one another. Further developments relating to the Railway Conference are described in Chapter Sixteen.

The First Telephones

While the provision of telegraph lines to connect stations with each other, and with the offices of the railway managers, was a *sine qua non* of train working and much attention and care was bestowed by the early builders on this essential facility, the telephone was a late comer. It was not till the concluding year of the 1870's that this speedier means of communication was introduced on the Indian railway system. The following excerpts from the *Times of India,* dated 29 November 1880, points out the experimental character of the first telephones :

> The telephone, it seems, has already been introduced into Madras, which for once has got ahead of the other "remote provincial recesses." A local paper says : Some time ago a proposal was made by the Agent of the Madras Railway Company, to connect his office at Royapoorum with the Traffic Manager's office at the Central Station and with the Locomotive Superintendent's office at Perambore by means of telephonic circuits, at an estimated cost of Rs. 2,294, as Mr Sunders considered it desirable that he should have the means of communicating with the Traffic Manager and the Locomotive Superintendent through a direct and private channel ; but the Consulting Engineer for Railways, to whom, we believe, the matter was referred, doubted whether the advantages to be gained bore fair proportion to the outlay, and suggested the traction of only one circuit in the first instance by way of experiment. In accordance therewith the erection of a telephonic circuit from Royapoorum to the Central Station was sanctioned by the Government as an experiment, and in order to fairly test its economy and advantages. We now learn that arrangements are being made to extend the existing circuits to the office of the Locomotive Superintendent at Perambore. This shows that the experiment has proved a success.

"Native Schools of Industry"

The question of training Indians for employment on the railways continued to receive the attention of the Government, and steps were taken to establish schools in which they would qualify for the position of foreman mechanic. In Bengal a school was started in collaboration with the Calcutta Engineering College. In the North-West Provinces a similar school was commenced. In Bombay, the Government had instituted classes for the same purpose in co-operation with the Poona Civil Engineering College ; and "Native schools of industry" were established at Dhulia, Dharwar, Ratnagiri, and Surat. In Madras, the Government considered

that provision already existed for the preliminary instruction of youths and adopted a system of apprenticeship at certain workshops whereby training was imparted before boys attained the position of foreman mechanic.

The employment of Indians as engine-drivers also received attention : and while there was still hesitation on the part of some British Railway Managers to leave in their hands the driving of passenger trains, or even goods trains on the main line, they were employed largely on branch lines and as shunters. On the East Indian Railway no less than 106 drivers and 117 shunters were Indians by 1880 ; and Mr D. W. Campbell, the Locomotive Superintendent, reported that they continued to give satisfaction. In order to extend the movement, and to qualify Indians still more for such duties, 18 departmental schools were established on this Railway, and the average daily attendance at these schools was about 400.

On the Oudh and Rohilkhand Railway also, owing to the interest taken in the matter by the Locomotive Superintendent, Mr Cooke, there were 55 Indian drivers, who were employed in connection with goods traffic and in shunting, and large numbers were in training.

It was estimated that since April 1875, there had been over a period of five years, a saving of Rs. 16 lakhs in wages alone through the introduction of Indian drivers and shunters.

Hill Schools

Some advance, although not a considerable one, was made with respect to providing the means of education on the hills for the children of Europeans and Eurasians employed on the railways. On the East Indian Railway particularly, the Company and the Government agreed on the necessity for taking measures to make good the deficiency, which had become of pressing importance ; and it was proposed to devote certain sums of money which had accumulated from the fines levied on the men for default in working, from savings, bank profits, and from other sources for the purchase of a building at Mussoorie, which was considered to be a suitable situation for a school.

The Great Indian Peninsula Railway was also willing to join with the Government in setting up a school for the benefit of the children of their servants at Pachmarhi, a hill station at an elevation of 3,500 feet, 27 miles from Piparia, about 100 miles west of Jabalpur. The climate was described as salubrious and suitable for the training for European children. The Directors also expressed their readiness to provide similar facilities for girls. Schools which had been established at Igatpuri and Bhusaval on that line had been working very well. At the Bombay Scottish Orphanage, arrangements had been made to provide for the education of 15 orphans of railway

servants. On the Madras lines schools were established at Jolerpattai (Jollarpet) and Pothanore, where from 80 to 100 pupils had been accommodated.

NOTES AND REFERENCES

1. General Report to the Board of Trade of the Railway Companies of the United Kingdom.

Annexure 8-A

Excerpts from the Contract between the Secretary of State in Council and the East Indian Railway Company as to the maintenance, management, and working of the undertaking by the East Indian Railway Company, dated 22 December, 1879.

Duration of Contract

This contract shall continue in force for the period of fifty years from the 1st of January 1880 subject to the provision hereinafter contained for determining the same.

As to deferring one-fifth of the Annuity

During the continuance of this contract the payment of one fifth of the annuity of £, 1,473,750 mentioned in the Act of 1879 shall be deferred and in lieu thereof interest at the rate of £4 per cent. per annum on the sum of £6,550,000 being the capital sum represented by such one-fifth shall be paid by the Secretary of State to the Company in London by half-yearly payments.

As to the Undertaking to be transferred to the Company and matters connected therewith.

On the 1st of January 1880 the Secretary of State shall hand over to the Company for the purposes of this contract the East Indian Railway together with the rolling stock, plant and machinery belonging thereto......

... ...

Supply of funds

All moneys required by the Company for the purpose of the undertaking shall be supplied to the Company by the Secretary of State according to such arrangements as shall from time to time be made between the Secretary of State and the Company.

Statements of Expenditure to be submitted for sanction

All moneys expended by the Company on account of the undertaking and all other expenses of the Company in connection therewith shall from time to time be stated and submitted to the Secretary of State for his sanction and as between the Company and the Secretary of State shall be

allowed only so far as the same shall from time to time have been sanctioned by the Secretary of State.

... ...

In the working expenses of the undertaking there shall be reckoned :

... .

London Office Expenses

Such sum or sums of money as shall from time to time be agreed upon between the Secretary of State and the Company as proper to be allowed in respect of the rent of the Company's Office in London, office expenses, Director's fees and salaries of clerks and servants.

... ...

Charges of State Control

Such a sum not exceeding Rs. 50,000 in any half year as may be required by the Secretary of State to cover the costs and charges of and incidental to the supervision and control of the Company by the Secretary of State.

... ...

Application of Receipts

The receipts of the undertaking in each half year after deducting working expenses and all other charges to Revenue Account properly attributable to that half-year shall be applied in the following manner and in the following order :

(1) *Interest on debenture stock.* In payment of interest upon the debenture stock of the Company in existence on the 1st of January 1880, and upon the debentures of the Company outstanding on that day.

(2) *Annuity not deferred.* In payment to the Secretary of State of so much of the annuity of £ 1,473,750 as is not deferred under this contract.

(3) *Interest in lieu of annuity deferred.* In payment to the Secretary of State of interest at the rate of 4 per cent per annum on the capital sum represented by the portion of the annuity deferred under this contract.

(4) *Interest on Capital and Capital Advance Account.* In payment of interest payable to the Secretary of State on money standing to the debit of the Capital Advance Account and the Capital Account.

(5) *Interest on value of stores in hand.* In payment of interest payable to the Secretary of State on the value of stores in hand.

(6) *Payments to Provident Institution.* In payment of such sum as shall from time to time be payable to the Provident Institution in connection with the undertaking.

(7) *Application of surplus.* And the surplus if any shall be applied in manner following that is to say four-fifths thereof shall belong to the Secretary of State on behalf of the Government of India and one-fifth thereof shall belong to the Company and shall as soon as ascertained be forthwith paid over to the Company at Calcutta for distribution among the persons entitled thereto under the Act of 1879.

Supervision and Control

In all matters relating to the undertaking and not herein specially provided for the Company shall be subject to the supervision and Control of the Secretary of State.

Government Director of the Company

The Secretary of State may from time to time appoint any one person to be a Director of the Company. The Government Director shall be *ex officio* a member of all Committees appointed by the Board of Directors of the Company or by the Company in relation to the undertaking or any matter connected therewith and he may moreover exercise at his discretion an absolute right of veto in all proceedings whatever at the Board of Directors. The Government Director shall not be removable except by the Secretary of State.

Determination of Contract

The Secretary of State or the Company may determine this Contract at the end of the 20th or at end of any succeeding 5th year (computed from the 1st of January 1881) of the said term of fifty years on giving two clear years' notice in writing to the other party hereto of his or their intention so to do.

9

At the Turn of the Century

Railway lines in India were being built by private companies, the State and the Indian Princes. Construction costs of State lines were undoubtedly lower than those of the Guaranteed Railways due to the strict economy observed by the Public Works Department, of which the railways were a branch and the selection in most cases of the metre gauge rather than the wider 5 ft 6 ins gauge.

With the financing of the construction of railway lines by the State, the concept of Productive and Strategic lines entered the picture. For example, in despatch No 31, London, 22 February 1883, the Secretary of State informed the Governor-General that the bridge over the Jamuna at Mathura, to connect the Mathura-Hathras and Mathura-Achnera railways was a productive work and could be financed out of Productive Public Works.

Para 10 of the despatch mentioned above stated :

> "In Lord Hartington's despatch of the 6 January 1881, No. 1 (Financial), it was laid down that the annual allotment of £ 2,500,000 might with propriety be increased when an actual surplus of revenue was available for the purpose. Assuming then, that the Government of the North-West Provinces had earned as surplus revenue, the sums devoted to the construction of the Hathras-Farrukhabad and Jamuna Bridge sections, the amount would be available for expenditure on a Productive Public Work. The amount spent would be transferred from the Provincial balances to those of the Supreme Government

and would thenceforth be treated in the same manner as the sections already classed as Productive."

Productive, Protective and Provincial Railways

At this stage, the Government found it necessary to define 'Productive', 'Protective', and 'Provincial' Railway undertakings. By a 'Productive' work was meant an undertaking which could be estimated to pay, "within a maximum limit of five years from the date of the line being opened for traffic, 4 per cent on the capital invested, including therein all arrears of simple interest incurred up to that date and also the capitalised value of the land revenue and of leave allowances and pensions." Such a work could be constructed out of borrowed money.

By a "Protective" work was meant an undertaking not "necessarily directly remunerative, but obviously protective in the sense of guarding against a probable future outlay in the relief of the population." Such a work could not be executed out of borrowed money and the capital required for its construction had to come out of the revenues of the country. Protective works were obviously designed to provide against scarcity caused by famines.

A "Provincial" work was one that was undertaken by a Local Government which guaranteed interest on all capital advanced, whether that capital had been obtained from the Government of India, from provincial funds, or from local sources.

The British Government appointed a Select Committee to go into the question of Railway Communications in India. This Committee, while expressing itself in favour of a rapid expansion of railways, opined that a rigid distinction between productive and protective lines could not be maintained, that the bulk of the lines should be self-supporting, that a famine grant for protective lines by the Government of India be maintained, that in certain circumstances money for railway construction could be borrowed in England, and that the Public Works Department should not be overloaded with the responsibility of building railway lines at state expense beyond the capacity of that Department. There were the main features of the despatch sent by the Secretary of State, from which an excerpt is reproduced as Annexure 9A, to the Governor-General. It clearly opened the way to a revival of private investment from England in railway expansion in India.

It was decided that while new productive and profitable lines should be left entirely to private commercial undertakings, the Government should

undertake the construction of railways, which due to their unprofitable character in a commercial sense or some cause, could not be built by private agencies. Thus, in the 1880s started an era of company lines constructed and administered side by side with State lines. A considerable mileage of railways was also constructed by the former Indian States either through the Agencies of the Companies, Government or the Durbars themselves. Several minor lines were the property of District Boards or enjoyed a guarantee of interest from them.

Considerations Underlying the Rapid Expansion of Railways

In the preceding chapter, we had referred to some rethinking on the part of the Government of India in regard to utilizing private capital, after-a phase of State enterprise, for the expansion of the Indian Railways' network. Here we describe the reasons for this shift in Government policy.

Apart from considerations relating to the general economic development of the country, internal and military requirements, another factor that weighed with the Government was the need for the rapid distribution of foodgrains. During the five years, from 1874 to 1879, India was visited by a series of famines. The Famine Commission appointed in 1880 emphasised the great importance of railways for the protection of the country from famines and observed that the country could not be held to be safe from famines in the future until the Indian railway system was extended to about 20,000 miles (32,200 km).

While state construction of railways was inadequate to meet the requirements of the country and the guarantee to the private companies on the old lines was obnoxious, the Famine Commission remarked :

> "There would be manifest advantage in giving free scope to the extension of railways by private enterprise, if it were possible ; and though the original form of guarantee has been condemned, it may not be impossible to find some substitute which shall be free from its defects, and may secure the investment of capital in these undertakings without involving the government in financial or other liabilities of an objectionable nature."

It will be recalled that India had a little over 9,000 miles (14,490 km) in 1880. The decision to build famine railways attracted the criticism that money spent on these was wasteful in the sense that it could have been with greater advantage spent on irrigation projects. But such criticism has not been justified by the long history of Indian Railways which have

been frequently used to avert starvation by transporting huge quantities of foodgrains from surplus to deficit areas.

In view of the necessity of rapid expansion of railways in the country, Government had again to fall back upon private companies for the construction of new lines. The Afghan war in 1878 led the Government to consider the need for extension in yet another direction, namely, the opening of railway lines for purely strategic purposes.

By 1890, the Indian Railways system had expanded to 16, 345 miles (26,315 km), 9,738 (15,678 km) on broad gauge and 6,608 (10,637 km) on metre gauge and narrow gauges. Nalhati 27.25 miles, (43.87 km) stood out as an odd line on 4 ft gauge. The broad division of the railway lines in India by ownership and management in 1890 was as follows :

1. State Lines worked by Companies
2. State Lines worked by the State
3. Lines worked by Guaranteed Companies
4. Lines owned by Native States and worked by Companies.
5. Lines owned by Native States and worked by the State Railway Agency.

The details of mileage open under such category at the end of the year and the capital cost will be found in Annexure 9B.

Three Guaranteed Lines on Modified Terms

The British Parliament had been pressing for a rapid expansion of the Indian Railways, presumably at the instance of private investors in England anxious to reap the benefits of railway enterprise in a country, which held out the promise of lucrative trade and prosperity, and the recommendations of the Famine Commission gave added weight to such expansion. In the circumstances, three more guaranteed railways were formed in the 1880's.

One of these was the Indian Midland, which was merged with the GIP in 1900. This line formed junctions with the larger system at Agra, Delhi and Jhansi. The second guaranteed line, the Bengal Nagpur was a much larger system which ran from Nagpur, where it made a junction with the GIP, to Howrah. The third guaranteed line was the Southern Mahratta Railway, stretching from Pune to Bangalore and Mysore, and from Vijayawada to Goa, although in Goa its role was that of managing the West of India Portuguese Railway, which is described later.

The lines constructed by the new guarantee railway companies were declared to be the property of the Secretary of State for India, who had

the right to determine the contracts at the end of 25 years, or at subsequent intervals of 10 years, on repaying at par the capital provided by the companies. Interest was guaranteed on the capital raised by the companies at a lower rate, mostly at 3½ per cent, and the Government retained a much larger share, usually three-fifth of the surplus profits.

The Bengal and North Western

One of the unguaranteed lines was the Bengal and North-Western, which entered into a contract with the Secretary of State on 12 December 1882. In the first phase of construction, it built from Mankapur to Gonda, a distance of 17 miles (27.37 km) on the main line, Mankapur to Nawabganj, 13 miles (20.93 km), on the Ayodhya branch and Gonda to Bahraich, 37 miles (59.57 km), on the Naipalganj Road branch. All these three sections were opened on the metre gauge on 2 April 1884.

In spite of the Bengal and North-Western receiving no Government aid, the Company laid an extensive mileage of metre gauge track north of the Ganga and south of Nepal. Under the original contract of 1882, any profit over 6 per cent was to be equally divided between the Government and the Company, but this provision was rescinded in 1886 and thereafter, the profit was left entirely in the hands of the Company. On 18 July 1890, the Secretary of State entered into another contract with the company, giving over to it the working of the State railway, known as the Tirhoot Railway.

Rohilkhand and Kumaon Railway

Though termed as an unguaranteed railway, the Rohilkhand and Kumaon Railway Company was given a guarantee for a short period, just to enable it to start off. According to a contract dated 12 October 1882 between the Secretary of State and the Company, "Government guaranteed interest at 4 per cent per annum in sterling on the capital up to £200,000, expended on the Company's original railway until its opening throughout for public traffic but for no longer than and including 1st January 1885, thereafter a subsidy of Rs 20,000 half-yearly for ten years from the date of opening," and this ceased on 31 December 1894.

The Company built its first line Bhojipura (Bhojeepura) to Kathgodam, 54 miles (87 km), and opened it to public traffic on 12 October 1884, followed by Kasganj to Saron, 9 miles on 4 January 1885, but the line upto Bareilly was not completed till the year 1906. Bhojipura to Bareilly. 12 miles

(19.32 km) was built and opened to traffic, as a part of the Lucknow-Bareilly Railway on 12 October 1884. Lucknow to Pilibhit, 163 miles (264.43 km) was opened in four stages also by Lucknow-Bareilly Railway between November 1886 and April 1991. The link between Pilibhit and Bhojipura had been established earlier in November 1884. The metre gauge track was laid on 41¼ and 50 lb rails, on locally procured and Australian sleepers. The line was partly fenced.

South Indian Railways Purchased

The lines formerly owned and worked by the Great Southern Railway of India and the Carnatic Railway Companies had been amalgamated on 1 July 1874 under the title of South Indian Railway. The Secretary of State intimated to the Governor-General on 7 January 1891 that it had been decided that the South Indian Railway and the Villupuram-Guntakal State Railway be purchased by the Government, taken over and worked from 1 January 1891 by a new company, South Indian Railway Company (Limited).

West of India Portuguese

Some railways in India were known as foreign lines, as they were situated in the foreign territories of Portugal and France. The West of India Portuguese line was undertaken by a Company under a guarantee given in April 1881 by the Portuguese Government ; it extended from Mormugo, in the Portuguese settlement of Goa to the Portuguese frontier. The harbour end line, 41 miles (66 km), was opened for public traffic on 17 January 1887, and the remaining ghat section of 10 miles (16 km) on 3 February 1888.

Pondicherry

This 8-mile (13 km) line was undertaken by the Pondicherry Railway Company under a concession made by the French Government. It was opened in December 1879 from Gingee River to Pondicherry, but the bridge of seven spans of 150 feet each over the river was almost entirely washed away by the floods of December 1884. This line was worked and maintained by the South Indian Railway Company.

The policy of rapid expansion of the railway system in India bore fruit and the mileage inclusive of Burma, rose from a little over 9,000 (14,490 km) in 1880 to 24, 760 (39,863 km) in 1900, an addition of more than 15,000 miles (24,150 km) in 20 years.

Hill Railways

India is famous for its hill railways which are remarkable as marvels of engineering. Two of these, the Darjeeling Himalayan Railway (DHR) and the Kalka Simla Railway (KSR) followed the roads which had been built by military engineers. The cart road from Kalka to Simla was built in 1856 and that from Siliguri to Darjeeling in 1861.

But the first hill railway to be built was the DHR. It took two years to build and was completed in 1881. The line consists of 51 miles (82 kilometres) of a two-foot track, zig-zagging over deep ravines and precipices, taking sharp curves and rising over steep inclines, and reaching a height of 7,000 feet in forty miles. The ruling gradient is 1 in 25 although in places it is 1 in 20 and in one place actually 1 in 19. The sharpest curve has a radius of 59 feet. The need for tunnels was completely obviated by means of 'loops' and 'reverses.' In the 'loop' the railway track circles around and passes over a gradient by means of a bridge thereby quickly attaining a higher elevation. In the 'reverse' the same objective is obtained by running the track back diagonally and upwards for a short distance, and then using an alignment parallel to the original alignment but higher up the side of the mountain.

The idea of a railway to Simla was mooted as early as 1847. In the Delhi Gazette, a correspondent in November 1847, sketched the route of the railway line to Simla with detailed estimates of cost and traffic returns. He wrote: "We may then see these cooler regions become the permanent seat of a Government, daily invigorated by a temperature adapted to refresh a European constitution, and keep the mental power in a state of health, alike beneficial both to rulers and the ruled."

It appears that in 1893 there were two parallel bullock cart services on the Kalka-Simla road, one run by government at Rs 1.4 per maund and another run by the East Indian Railway who had opened an agency in Simla at Re 1 per maund. The Directors of the Delhi-Umbala-Kalka Railway (DUK) suggested that an end be put to this unfair competition (government had also reduced its rate to Re. 1) by EIR's agency taking over the bullock train. It was not, however, till 1903 that the railway could be built. The sixty miles (96 kilometres) of 2 ft 6 in narrow gauge track between Kalka and Simla runs through picturesque mountains country ascending from 2,800 feet, the elevation of Kalka, to 7,000 feet. Besides innumerable cuttings and embankments, the route runs through as many as 103 tunnels totalling five miles in length. The longest tunnel is 3,752 feet at an altitude of 5,000 feet. It has one long welded rail, one kilometre long, the only one of its kind on the narrow gauge in India. The numerous picturesque arch viaducts over which the track runs aggregate one and three

quarter miles. A special feature of the line is multi-staged arch galleries in lieu of conventional bridges. The deepest is No 541 with 4 stage arches at Kanoh station. Its height is 18 metres. The completion schedule of Kalka-Simla Railway was submitted by the Agent and Chief Engineer KSR on 5 July 1904 showing total expenditure of Rs. 1.76 crores. The station building at Barog cost only Rs. 10,000 and at Simla, including the shed for rickshaws just Rs. 35,000.

The Nilgiri Mountain Railway commences from Mettupalayam, the terminus of the broad gauge system of the Southern Railway, and runs to an altitude of 7,500 feet to Ootacamund, one of the prettiest summer resorts in South India. The Scheme for the construction of a railway from Mettupalayam to Coonoor, a distance of 16.99 miles, dates as far back as 1854. The Madras Times of 27 October 1881 carried the following report :

> "We learn that the authorities at Calcutta approve of the construction of the proposed line of railway on the Rigi system from Mettapulum to Coonoor, by the Nilgiri Railway Company, on the following conditions only, viz—(1) a Government guarantee of 4 per cent for five years from date of through opening of line which must be completed within three years of undertaking ; (2) guarantee to be paid from Provincial funds as the line will serve only provincial interests and not form a proportion of the great railway system of India ; (3) the guarantee to be in rupees and not in sterling money ; (4) arrangements must be made for the conveyance of Government mails, soldiers, police and treasure at special reduced rates ; (5) one mixed train, at least, must run daily in each direction; (6) that fares be at the discretion of the Company but within a maximum fixed by Government ; (7) that Government be permitted to purchase the line at intervals of 10 years or other periods that may be fixed upon by the local Government ; (8) that Government be reimbursed all profits earned in excess of 5 per cent, interest meanwhile being calculated at 4 per cent, simple interest ; (9) Government will provide the land required by the Company for way and works. If these terms are agreed upon, a contract upon their bases will be drawn up between the Company and Government."

It was not until 1891 that the work of construction was started by the original Nilgiri Railway Company. In 1894, the Nilgiri Railway Company went into liquidation and a new company was formed in 1896. The line up to Coonoor was finally opened in June 1899. On 1 January 1903, the Government purchased the new Company and work was taken in

hand to construct the 11.95 miles to Ootacamund. The line 46.61 km, was completed in October 1908. Owing to the extraordinarily steep character of the line, rack bars on special chairs had to be provided at several places centrally between the track rails. These rack bars are laid on the slope of the line itself and form a sort of ladder up which the engine climbs and pushes the train.

At a distance of about 60 miles from Bombay lies Matheran, a favourite hot weather resort of Bombayites. 'Matheran' meaning 'forest on the top', is situated at an average height of 2,500 feet above sea level, and was discovered in May 1850 by Mr Hugh Poyntz Malet, the Collector of Thana. The visit to this station in 1855 by Lord Elphinstone, the then Governor of Bombay, laid the foundations of the future development of Matheran as a hill station. This 2-foot narrow gauge hill railway, connecting Neral, a station on the south-east section of the Central Railway main line, to Matheran was opened to traffic in 1907. It was built by Sir Adamjee Peerbhoy, who formed a limited company with an authorised capital of ten lakh rupees, divided into 2,000 shares. The railway is 12.6 miles (20 km) long and has a gauge of two feet with a ruling gradient of 1 in 20. The track zig-zags up the side of the hill, bringing into view the full beauty of the Matheran Hill.

Indian Railways Make Profits

It was recorded in the Railway Board's Report on Indian Railways for 1900 that for the first time since the commencement of railways in India over half a century earlier, there was in that year a surplus to the State of revenue over expenditure, amounting to nearly Rs. 8.75 lakhs. In the calendar year 1901, there was a similarly satisfactory record and the surplus to the State at the close of the year amounted to over Rs. 115 lakhs.

These results were creditable in spite of the expenditure side of the account being heavily weighted by the terms of the contracts of the Guaranteed Railways. Under these contracts, payments of interest had to be made at higher rate than was necessary, and the calculation of the surplus profits had to be made at 22 pence to a rupee, while the current rate of exchange was nearer 16 pence. Until these contracts were terminated, the State was unable to obtain any advantage from cheaper money, or from the improved credit of the country, or from a favourable exchange rate. There were however, only two such contracts remaining in 1900, viz. the Bombay, Baroda and Central India, and the Madras Railways, which were terminable on 31 December 1905 and 1907, respectively. The total expenditure borne

against Capital, both on railways open and railways under construction, at the close of the calendar year 1900 was Rs 3,43.33 crores.

Summarised, the general results of working Indian Railway during the four years 1897-1900 including Burma and the territories which now from part of Pakistan and Bangladesh, were as follows :

Year	Mileage open on 31 December	Gross Earnings (in thousands of rupees)	Working expenses (in thousands of rupees)	Net earnings (in thousands of rupees)	Per cent of net earnings on outlay	Profit per cent of net expenses to gross earnings
1897	21,123	25,60,11	12,47,73	13,12,38	4.65	48.74
1898	22,048	27,45,59	13,01,99	14,43,60	4.53	47.42
1899	23,528	29,41,25	13,96,22	15,45,03	5.00	47.47
1900	24,760	31,59,65	15,12.91	16,46,74	4.99	47.88

The Administrative Report of the Indian Railways for 1901 went on record :

> "The Indian Railway system having for two years in succession been worked at a profit to the state, it may now be regarded as having ceased to be a burden to the general revenues of the country ; and the net receipts from railways may be expected in future to be one of the most certain and increasing sources of State revenue."

The Indian Railways Act, 1890

An important event in the last quarter of the nineteenth century was the passing of The Indian Railways Act, 1890 (Act IX of 1890) which came into force on 1 May 1890. This was the most important and comprehensive legislation on Indian Railways. A few years earlier was passed the Railway Act 1879, wanting in many respects. An important clause in the 1890 Act laid down that no railway was to be opened for the public carriage of passengers till the line had been inspected by an officer of the Government and until he had reported that the line was safe. The Act exhaustively dealt with construction and maintenance of works, inspection of railways, opening of new lines. responsibilities of railway administrations as carriers, accidents, penalties and offences, thus covering all

aspects of railway working, particularly in the matter of services to the public. Its important provisions are described in Chapter Eleven.

The Act of 1890 was silent on the question of the fixation of rates and fares,though it had a provision for the appointment of a commission, when the Governor-General in Council thought fit to do so, to take congnizance of such cases as may be referred to it by the Government of India. The Act described the nature of the cases that may be referred to the Commission, and these were complaints of undue preference, terminals, disputes regarding through rates between different railway companies etc. But no such commission was appointed as a result of which the Guaranteed Companies continued to enjoy a lot of freedom in the matter of fixing their charges.

This freedom was due to the limited powers of the Government of India, as explained by the Law Member when he introduced the Railway Bill in the Legislative Council in October 1888. He said, "The power of the Government of India, in regard to some of these railways is limited, to a greater or less extent, by the contracts made with the various Companies by which the railways have been constructed or are worked. In framing the present Bill care has been taken to maintain the provisions of these contracts so far as they are consistent with due regard to the public interest."

The policy of the Government was to fix maximum rates and fares within which the companies were free to charge at their own discretion. But there was a possibility that the Companies might fix rates so low as to cause a loss to the public exchequer. The Government of India had, therefore, to fix minimum rates and fares also. It explained its policy in these words :

> "That the schedule of maxima and minima rates and fares shall be adopted on all railways worked directly by the State and by all other railway administrations, whether their lines be already opened or not so far as this schedule is not inconsistent with any contracts or agreements previously entered into : and that it shall not be departed from without due cause being shown. That there shall be no undue preference, either as between two railway companies or between a railway company and a particular person or class of individuals by making preferential bargains, or by granting to one particular company or person more favourable conditions for the carriage of goods than to the rest of the public at large."

Passenger Classes and Fares

The passenger fares had been kept low on the Indian Railways from the beginning, the fare for the lowest class being 3 pies per mile ,that

is less than $^1/_3$rd penny. A rupee consisted of 16 annas and an anna was worth 12 pies. In other words, a rupee had 192 pies. As the years advanced, the Government of India insisted that the lowest class passengers should have the benefit of very cheap fares. In 1881, the East Indian Railway Company had fixed the lowest class fare at 3 pies per mile, but it had to reduce it to 2½ pies under the orders of the Government. In the 1880s, some other railways also reduced their lowest class fares to 2½ ps per mile and the Tirhoot went down so low as 1.75 ps per mile in 1885. This gave very satisfactory results : the number of passengers having increased by over 70 per cent on the average, with a substantial increase in the receipts.

The table here shows the ordinary passenger fares on some of the principal Indian Railways on 31 December 1885 ; one line from each of the five categories is represented here :

Railway	Passenger fares per mile			
	1st Class pies	2nd Class pies	Intermediate or 3rd Class pies	4th or lowest class pies
State Imperial				
East Indian	18	9	4.50	2.50
State Provincial				
Northern Bengal	18	9	4.00	2.50 & 2.00
Guaranteed Companies				
Great Indian Peninsula	12	6	3.00 & 2.50	...
Native States				
The Nizam's	18	6	2.50	2.00
Assisted Companies				
(Unguaranteed) Rohilkhand-Kumaon	29.94	...	8.87	2.32

As will be seen from this table, some railways had four classes : 1st, 2nd, 3rd and 4th. Later the 4th class was abolished and an intermediate class was introduced between the second and the third classes. From 1 July 1885, the intermediate class was adopted on the South Indian Railway, the fare being 3 pies per passenger per mile. At the same time the 2nd class fare was raised from 4 to 5 pies per mile, while the 3rd class remained at 2 pies.

From November 1885 the designations of the 3rd and 4th classes on the Nagpur-Chattisgarh Railway were changed to intermediate and 3rd class, the fares remaining unaltered : intermediate 4 pies and 3rd class 2 pies per mile. On 1 February 1886, the 3rd class passenger fares on the Bengal and North Western Railway were reduced to 2 pies per mile. The average receipt per passenger-mile on the Indian Railways in 1885 was 0.24 pence or 2.56 pies.

Goods Freight Rates

The charges for the transport of freight by goods trains were also kept low. To take two examples, foodgrains and coal which moved in large quantities on the Indian Railways in the 1880s, and still do. The charge for foodgrains was 5 pies to 6 pies per ton per mile and that for coal 6 pies per ton per mile on the GIP Railway. The EIR offered a telescopic scale as shown below :

Foodgrains

	pies per ton per mile
All Stations except Howrah	
For first 100 miles	9.07
For extra distances over 100 up to 450 miles	4.67
For extra distances above 450 miles	3.27

Coal

for distances under 100 miles	9.07
,, ,, ,, over 100 and under 300 miles	6.80
,, ,, ,, over 300 and under 600 miles	4.54
,, ,, ,, over 600 miles	3.89
For North Western Railway from Giridih to Ghaziabad (special rate)	3.27

A comparison of the rates of some of the important staples of goods traffic on the Indian and European railways in 1885 showed that except for coal, Indian freight rates were generally lower. (In working out the Indian rates the exchange was calculated at 1s 6d = Re 1). While coal cost 0.51 pence per ton-mile in England, the rate on Indian Railways averaged to 0.64 pence per ton-mile for short distance traffic up to 300 miles. It was as low as 0.37 pence per ton-mile in Belgium. While foodgrains cost 1.54 pence per ton-mile in England, it cost 0.85 pence in India and 1.13 pence per ton-mile in Germany. Special long distance rates for foodgrains quoted by the East Indian Railway, say from Delhi to Howrah, 954 miles, were as low as 0.27 pence per ton-mile. The average receipt for goods traffic on Indian Railways in 1885 was 0.64 pence or 6.81 pies per ton-mile.

City Offices and Out-Agencies

Such innovations as city offices and agencies at places at some distance from a rail head were introduced on the Indian Railways in the nineteenth century. For instance, a town delivery was established during 1885-86 in Calcutta and consignees could book goods of all descriptions from a forwarding station to any address in the town or suburbs of Calcutta.

An agency of the Rohilkhand-Kumaon Railway was opened at Nainital, and a cart service established for the conveyance of goods from Kathgodam station to Nainital. Arrangements were also made for the through booking of goods to the latter place from all railways. A tonga service between Kathgodam and the brewery was also established.

Thus we find that before the Indian Railways steamed into the twentieth century, the interest of the Indian public had become an important concern of the Government of India. There was a rapid expansion of the railway network. New private companies commissioned by the Government were guaranteed a lower rate of interest. The policy of purchasing company lines continued. Greater attention was being paid to passenger amenities, described in some detail in a later chapter. There was insistence on the part of the Government on low passenger fares, while the companies having found these profitable, easily fell in line. Government fixed the maxima and minima rates for goods traffic, which were generally kept low, though this was partly due to competition between railway companies, such as between GIP and BB & CI Railways. Some railways extended their services to establish city booking agencies and out-agencies, worked by cart services.

Annexure 9-A

House of Commons

Select Committee Report Despatch No. 89 from Secretary of State to Governor-General, 14.8.1884.

The Select Committee of House of Commons on Railway Communications in India has made the following recommendations :

Para 4. The Committee consider that the evidence in favour of a more rapid expansion of railways is conclusive (para 20) ; that the maintenance of the rigid technical distinction between productive and protective lines cannot be maintained (p. 28) ; that the amount proposed to be spent upon Railways, from all sources, by the Government of India in the next 6 years is moderate (p. 30) ; and that money may, in certain circumstances, be borrowed in England to carry out such schemes as shall have been approved by the Secretary of State (para 31).

But they are of the opinion that bulk of the lines should be self-supporting (p. 28) that no portion of the Famine Grant should be hypothecated as interest on capital (p. 32) and that Railway extension should not involve additional taxation (p. 34).

They also recommend that responsibility for deciding what amounts, with safety to the finances, be borrowed for public works should rest with the Secretary of State.

Para 7—Your Government at present allot £500,000 from the Famine Grant for protective lines and also an annual sum from Revenue (under the head of State Railways, not classed as productive) of about £300,000. Continuing the former allotment as heretofore, it will now be possible, without departing from the principles laid down in the Report, by a suitable adjustment of your ordinary Public Works grant, to provide a moderate sum, as a charge against the general revenues, for the payment of interest on capital outlay for Railways of the non-productive class, and I shall be ready to sanction an allotment of borrowed capital, not exceeding £400,000 or £500,000 yearly for expendiure on lines of this description, thus providing means for the more rapid construction of famine lines than has been heretofore possible.

Para 10— In considering the methods by which railway construction may be more actively proceeded with, it must be borne in mind, I shall be extremely averse to the operations undertaken directly by Government being extended beyond the capacity of the present Public Works staff, against the increase of which the Committee have reported. It will be necessary, therefore, to determine which lines may most advantageously be conceded to Companies, and upon this important point, I await your Lordship's opinion.

Sd. *Kimberley*

Annexure 9-B

Statement showing mileage and cost of Indian Railways for the year 1890

Serial Number	Railway	Miles open at end of year	Capital outlay at end of year (in thousand of rupees)	Cost per mile open
	STANDARD GAUGE			
1.	**State Lines worked by Companies**			
	East Indian	1,525.44	35.15,04	2,30,428
	Patna-Gaya	57.20	43,46	75,992
	Bengal-Nagpur	586.01	6,22,72	1,06,265
	Indian Midland	677.35	7,88,56	1,16,419
	Bhopal-Itarsi (British section)	13.00	12,85	98,852
	Dhond-Manmad	145.5	1,09,81	75,475
	Bezvada Extension	21.47	13,90	64,780
2.	**State Lines worked by the State**			
	North Western	2,392.50	37,94,18	1,58,587
	Amritsar-Pathankot	64.79	56,06	86,537
	Jammu and Kashmir (British section)	8.40	2,74	32,296
	Oudh and Rohilkhand	692.55	9,04,18	30,559
	Eastern Bengal (Eastern and Southern section)	249.29	5,33,25	2,13,905
	Bengal Central	125.01	95,95	76,754
	Wardha Coal	45.00	54,48	1,21,072
3.	**Lines worked by Guaranteed Companies**			
	Great Indian Peninsula	1,288.24	26,98,48	2,09,471
	Bombay, Baroda and Central India	460.90	9,29,15	2,01,590
	Madras	839.30	11,49,41	1,36,949

4. Assisted Companies			
Tarakeshwar	22.23	17,28	77,768
5. Lines Owned by Native States and worked by Companies			
Khamgaon	7.50	4,85	64,736
Amraoti	5.50	4.36	79;356
Bhopal-Itarsi (Native State section)	44.11	48,88	1,10,815
The Nizam's Guaranteed State	329.20	3,68,35	1,11,895
The Gaekwar's Patlad	13.35	6,47	48,526
6. Lines Owned by Native States and Worked by State Railway Agency			
Rajpura-Bhatinda	107.94	64.15	59,431
Jammu & Kashmir (Native State section)	15.92	11.10	70,342
Total & Average	9,737,79	1,58,49,86	1,62,767

Annexure 9-B

Statement showing the mileage and cost of Indian Railways in the Year 1890

Serial Number	Railway	Miles open at end of year	Capital outlay at end of year (in thousand of rupees)	Cost per mile open
	METRE AND OTHER NARROW GAUGES			
1.	**State Lines Worked by Companies**			
	Tirhoot	322.53	2,22,98	69,137
	Bengal and North-Western	376.00	2,32,45	61,823
	Bareilly-Pilibhit	36.00	15,37	42,713
	Rajputana-Malwa	1,671.83	12,52,86	74,880
	Southern Mahratta	1,043.70	9,09,53	87,146
	Southern Mahratta, Mysore section	296.00	1,40,88	47,597
	Villupuram-Guntakal-Nellor-Tripati-Section	82.90	52,26	75,069
	Nillupuram Tiruvanna-malai section	42.45	14,36	33,828
2.	**State Lines worked by the State**			
	Lucknow-Sitapur-Seramau	104.59	35,64	34,076
	Eastern Bengal	514.61	4,14,41	80,530
	Nalhati	27.25	3,20	11,777
	Cherra-Companyganj	7.50	3.46	46,226
	Jorhat	28.40	7.21	25,417
	Burma	336.00	2,94,09	87,528
	Toungoo-Mandalay	220.00	2,05,59	93,454

3. **Lines Worked by Guaranteed Companies**			
South India	654.61	4,62,65	70,677
4. **Assisted Companies**			
Deoghur	4.79	2,81	58,701
Rohilkhund-Kumaun	55.00	20,37	37,040
Darjeeling-Himalayan	51.00	28,50	55,893
Dibru-Sadiya	78.00	56.75	72,767
Thaton Duyinzaik	8.00	4.48	56,010
5. **Lines Owned By Native States and Worked by Companies**			
The Gaekwar's Dabhoi	71.66	17,37	24,247
The Gaekwar's Mehsana	27.73	9.19	33,171
6. **Lines Owned and Worked by Native States**			
Jodhpore	124.00	22.73	18,333
Bhavnagar-Gondal-Junagarh-Porbandar	329.16	1,64,45	49,961
Morvi	94.00	19,96	21,245
Total and average	6,607.75	46,22,69	69,959
Total and average, Guaranteed and Assisted,	3,462.07	53,69,92	1,55,107
Total and average, State	12,883.47	1,51,02,63	1,17,225
Grand Total and	16,345.54	2,04,72,56	1,25,249
Average	(26,316.31 km)		

10

Development of the Railway Organisation–The Railway Board

As the first railway lines were laid in India by the Guaranteed Companies, the Government of India had to create a suitable machinery to exercise supervision over their construction and working. This was initially secured through the appointment of a Consulting Engineer for Railways in the Public Works Department at the Headquarters of the Government in Calcutta.

Control from London

In the earlier years of the guarantee system the Court of Directors of the East India Company had very strongly urged a real and positive control. In November, 1849, in a despatch to Lord Dalhousie, they wrote, "It is our desire that while the supervision and control should be entire and efficient, every facility compatible therewith should be afforded to those who may be employed by the railway company for the purpose of carrying out the undertakings." And again at about the same time, they said, "It has been deemed necessary in the arrangement which has been entered into to insist upon complete supervision and control by the East India Company of the railway companies and their officers, servants, and agents in all accounts, matters, and affairs whatever, both during the construction of the railway, and after it shall have been opened for the conveyance of passengers and goods." And though subsequently, under pressure from the public in England, the reins were somewhat relaxed, yet the provisions of the agreements with the Guaranteed Companies, as regards supervision, had been by and large carried out.

Various methods were tried for the exercise of supervision over the Guaranteed Companies and these differed from time to time and from presidency to presidency. The hard fact that it took six weeks to two months for a despatch from London to reach Calcutta forced some devolution of responsibility to local authorities in India. In a despatch sent by the Secretary of State to the Governor-General in 1856, he stated, "It is expedient that the local government should for the most part superintend railways running through the respective presidencies and the territories of the native states under their control so as to secure the due provision of the land, the control over the execution and the preservation of the railway works during their progress and after their completion."

In Bombay, a committee was set up and given overall authority over the GIP Railway, but the arrangement did not work smoothly. So on 28 February 1865, the Directors of the GIP Railway Company in London wrote to the Bombay Committee that the latter would be replaced by Captain Osborn who had been appointed Agent with authority over all the departments of the service as was earlier vested in the Committee.

The control in England was exercised by an official director, who sat at the Boards of all guaranteed railway companies, and who had the power of veto on their proceedings ; and in India it was retained by the Government of India in its own hands, acting on the advice of a Consulting Engineer. The system had several drawbacks. Some years later, local Consulting Engineers were appointed to exercise control over the Guaranteed Railways and State-owned lines under company management. Though a reference to the British Government on all matters of detail had been found cumbrous and tedious, there were many instances where minor matters formed the subjectmatter of correspondence with the Secretary of State in London. Here is a gem from the Managing Director, Bengal and North Western Railway to the Secretary of State : "Sir, With reference to India Office letter No. P. W. 120 of 23 February 1892, I am directed by my Board to apply for the sanction of the Secretary of State-in-Council of India to an increase in the salary of the office boy from Rs 10 to Rs 15 per week, with effect from the 28 April last."[1]

Delegation to Local Government

All in all supervision over the Guaranteed Railways was in a great measure entrusted to the Consulting Engineers to each Local Government. They were posted at Bombay for the Great Indian Peninsula and Bombay, Baroda and Central India Railways ; at Madras for the Madras and South Indian Railways ; at Calcutta for the East Indian and Eastern Bengal Railways ; at Lahore for the Sind, Punjab and Delhi Railways ; and at

Lucknow for the Oudh and Rohilkhand Railway. The Consulting Engineers at Madras and Bombay were under the orders of the Governments of those two Presidencies ; those at Calcutta, Lucknow, and Lahore were under the immediate orders of the Government of India. The rules laid down for their guidance *inter alia,* were :

"1. All questions of general importance shall be referred to Government for decision. This will include the general direction of all lines of railway, the position of stations, and the general arrangements of the more important stations and works. But after the general sanction of the Government has been given to any project, all questions of detail can be disposed of, within the limits of the original sanction, by the Consulting Engineer.

2. All matters of routine, or payments, or acts in accordance with rule, precedent, or special agreement duly sanctioned, or undisputed contingent expenditure, may be dealt with by the Consulting Engineer without reference to Government.

3. All designs, estimates, and indents, whether for works or for establishments for carrying into effect objects already generally sanctioned by Government, may also be disposed of finally by the Consulting Engineer.

4. The Consulting Engineer may, without reference to Government, reduce the amount of indents, or direct a design or proposed operations to be modified if he thinks it necessary, but the Agent in such cases, if dissatisfied with the decision of the Consulting Engineer, may always request that the matter may be referred for the final orders of the Government.

5. When the sanction of the Consulting Engineer is given to any proposals of the Agent, in which both of these officers concur, excepting in those matters of great importance specially excepted above, the sanction so given shall, so far as the Government is concerned, be considered final."[2]

Conflict between Government and Companies

The system had its drawbacks, however judicious or competent a Consulting Engineer might be. Responsibility was not clearly defined, as it was divided between the engineers of the railway company and the Consulting Engineers. The former had to design everything ; but could execute nothing without the sanction of the latter both as to design and estimate. The engineers of the Government could originate nothing ; but had the responsibility of approving all, both plans and works.

An Agent sent up for approval of such general plans and estimates as

would pass muster with a Board of Directors in England ; but the Consulting Engineer, with whom the responsibility of sanction rested, felt unable to approve the designs and estimates and asked for explanations and details. This unhappy situation led to the setting up of a Select Committee of the British Parliament. As already stated in Chapter Four, this Committee recommended a less bureaucratic approach.

Parliamentary Committee

After a lengthy and careful investigation the Committee reported that though "some cases have been cited in which the Government superintendence has been productive of vexation and annoyance to railway officials, and has tended to impede that harmonious action between the Government and the companies which is essential for the rapid completion of their great works, yet no very material delay in the construction of the various lines appears to have resulted therefrom." "From the evidence adduced" continued the report, "Your Committee are led to believe that the progress of railways under construction in India will bear favourable comparison with that of English lines. Willing testimony has been given by many of the railway authorities to the value of the Government control to the interests of the companies themselves when rationally and temperately used." And, finally in summing up, the committee stated their conclusions thus : "That under a system complicated in its character, and necessarily somewhat cumbrous in its machinery—a system moreover, the greatest defect of which is the facility it affords for the evasion of responsibility—a clear and distinct definition of the duties, responsibilities, and extent of jurisdiction of all heads of departments, and those under them, is essentially requisite for its smooth and successful working ; always assuming that due care be taken to entrust discretionary power only to men who are to be relied on as competent to distinguish an effective general control from too minute an interference in details. By a judicious adherence to the spirit rather than the letter of the contract, your committee feel assured that arrangements may be simplified, united action for one common object secured, and railway enterprise in India may before long assume proportions commensurate with the vast commercial, agricultural and mineral resources of that country."

The effect of the investigation and of the report by the Committee of Parliament was highly beneficial. According to Mr Davidson "the most that could be said against the system of Government supervision having been freely stated ; and after calm consideration, a decision having been ecorded by an impartial tribunal that no change was desirable or

expedient ; men of all ranks, both agents and engineers, more cordially accepted the position in which the contract under the guarantee had placed them, and worked with a will to make the best of the arrangement."[3]

The officials of the railway companies learnt that the engineers with whom they had to deal with were competent as well as practical men ; obliged to be so from the very nature of the duties they had to perform such as the maintenance of safety standards and protection of labour against exploitation, and that no captious opposition, or unjust criticism, was to be expected from them.

Director General of Railways

The Government of India having in 1869 definitely adopted the policy of direct construction and ownership of railways a period of rapid development ensued and it became necessary to relieve the Public Works Department of the Government of India in some measure of the detailed control of railways. In 1874, a State Railways Directorate was established and the business connected with the administration of State Railways was transferred to the control of the Director of State Railways. This officer functioned on much the same lines as the head of a department under the Government of India. The Consulting Engineer to the Government of India for State Railways was consulted by him, but matters of substance had still to be referred to the Public Works Department. A special Deputy Secretary in the Railway Branch of the Secretariat of the Public Works Department was also appointed to conduct the correspondence between the Government of India and these officers.

Early in 1877 a further change was made in the organisation responsible for the administration and control of State Railways. In place of one Director of State Railways three Directors of Territorial Systems and one Director of State Railway Stores were appointed. The territorial divisions comprised the following systems : Central—1,179 miles, (1,898.19 km) Western—927 miles (1,492.47 km) and North-Eastern—830 miles (1,336.3 km). This division of the administration on a territorial basis proved unsatisfactory in practice, as it resulted in the issue of conflicting orders and to remedy this defect it was decided in 1880 to abolish the Directors of the Central and Western systems and to transfer the work allotted to them to the Consulting Engineer of the neighbouring Guaranteed Railways. The abolition of these two appointments resulted in an increase in the administrative work of the Secretariat ; and it was found necessary to raise the status of the Deputy Secretary, to whom was entrusted the power previously exercised by the Directors, to that of Director General of Railways.

Imperial, Provincial and Native States Railways

State Railways were classed under three heads : "Imperial, Provincial and Native States." Imperial Railways were constructed from Imperial funds and were generally under the control of the Director General of Railways. Provincial Railways were constructed from funds on which payment of interest was the responsibility of the Provincial Governments. These were controlled by the Local Governments and Administrations, under the general supervision of the Government of India. The third category comprised those lines which had been constructed on the financial responsibility of the Rulers of Indian States in whose territory they were laid. These were in most cases controlled by the Consulting Engineers to Government.

State Railways Directorate Expanded

In 1881, the Indian Railways, which were still designated as the Railway Branch for administrative purposes, functioned under the control and supervision of the Member of the Governor General's Council for the Public Works Department, who was assisted by a Deputy Secretary, Railway Branch for administrative purposes, and a Consulting Engineer for technical subjects. The functions of the Consulting Engineer overlapped those of the Director General, with whom he was "associated" as an adviser, the latter exercising control over the State Railways only. The Director General was assisted by Directors of Stores, Traffic and Construction. The accounts work of the Railway Branch continued to remain under the Accountant General, Public Works Department.

After 1881 further alternations in the administrative organisation were made and by 1890, the posts of Director of State Railways, Stores, and Director of Construction had disappeared and in their place there was an Under Secretary who was an ex-officio Deputy Director General of Railways. Further changes were made in 1897, when the post of Director General of Railways was abolished and the post of a Secretary to the Government of India in the Public Works Department was created in its place. The other administrative and secretariat appointments at the headquarters of the Government of India at the time were a Director of Railway Construction, with responsibility for Stores, a Director of Railway Traffic, two Under Secretaries, two Assistant Secretaries, and one Mechanical Assistant. Incidently, this was the first time, after the State Railways had been in existence for nearly thirty years that the need for a mechanical officer at the headquarters was realized. The post of Consulting Engineer for State Railways was abolished and the duties transferred to the two Directors.

Situation in 1902

In August 1901, Sir Thomas Robertson C. V. O., was appointed by His Majesty's Secretary of State for India in Council as Special Commissioner for Indian Railways "to enquire into and report on the administration and working of Indian railways, whether controlled by the State or by Companies, with special reference to the system under which they should be managed in India in the future." He summed up the situation on the Indian Railways as follows.

At the close of the year 1902, reported Sir Thomas Robertson, there were 25,936 miles (41,757 km) open, worked by 33 railway administrations, (1) twenty-four of these administrations were companies, controlling 17,754 miles (28,584 km); (2) five were Princely States with 2,184 miles (3516 km) ; and (3) four were Government, with 5,998 miles (9,657.78 km). Excluding Burma, but inclusive of territories which now form part of Pakistan and Bangladesh, the open mileage was 24,675 (39,728 km) and the number of administrations in the first group was twenty-four. Most of the mileage 19,214, (30,935 km) was the financial responsibility of the Government, it owned and worked 8,538 miles (13,746 km), it owned but leased to working companies another 4,615 miles (7430 km) and it guaranteed the interest on 6,061 miles (9758 km) of companies' lines. Of the remaining 5,462 miles (8,794 km), for which the Government had no financial responsibility, 1,104 miles (1,777 km) had been financed by companies without Government assistance apart from free land, 350 miles (564 km) had been financed by companies with subsidies or guarantees from local bodies, 766 miles (1,233 km) of branch lines had been built by companies under the 'rebate' terms, and 3,242 miles (5220 km) were owned or financed by the Princely States. For details see Annexure 10A and 10B.

Except for the Bombay, Baroda and Central India Railway Company whose contract was terminable in 1905, and the Madras Railway Company (terminable in 1907), there were two other lines whose contracts continued some of the objectionable features of the old Guaranteed Companies. The Southern Mahratta's one-fourth share of profits was calculated on the net earnings before deduction of interest on capital, so that the railway had little incentive to economise on capital expenditure. Its contract was terminable in 1907. The Assam Bengal Railway, whose contract was not terminable until 1921, had such a large capital expenditure and such low receipts that a profit seemed remote. It therefore had no incentive either to reduce expenditure or increase income, as it could rely on the Government guarantee of three per cent.

Sir Thomas Robertson examined the weaknesses of the organisation for the control and supervision of railways in India. Some of his important

observations were as follows. Managers of Companies working State lines were responsible not only to their boards of directors in London, but also to the British Government (through the Secretary of State in Council, the Government Director who exercised absolute power of veto, and the Consulting Engineer), and to the Government of India (through the Governor General in Council, the Railway Branch of the Public Works Department and one of the seven Government Consulting Engineers).

Regarding control by Consulting Engineers Robertson observed, "Strong representations have been made to me by Railway Administrations of the great inconvenience and difficulty which they experience in carrying out their duties owing to what they consider to be the excessive interference of the Government Consulting Engineers in India and their Deputies, and the Government Examiners of Accounts, in all matters connected with the administration of the railway. It was urged that, whereas previously the Government control extended only to principles and main items of expenditure, it had now developed into a close examination and criticism of the most petty details, and fault was found about the most trifling matters and opinions expressed how things might have been done differently, which led to no good and were only a source of irritation."

Robertson's Recommendations

In his report, which became available in 1903, Robertson recommended that the administration of the railways in India should be entrusted to a small Board consisting of a President or Chief Commissioner who should have a thorough practical knowledge of railway working, and should be a member of the Viceroy's Council for railway matters and two other Commissioners who should be men of high railway standing and should have a similar training to that of the President. He recommended that the Board should in addition to the necessary office establishment be provided with :

(1) A Secretary who should have received a suitable training in the practical working of railways and who could be ex-officio a Secretary to the Government of India.

(2) A Chief Inspector of Railways to advise on all technical engineering and mechanical questions.

(3) A suitable number of Government Inspectors.

Early in 1905 it was decided that the Railway Branch of the Public Works Department of the Government of India should be abolished and that the control of the railway system in India should be transferred to a Railway Board consisting of three persons, a President and two Members. The President of the Board was vested with the general control of all questions committed to the Railway Board with power to act on his own

responsibility subject to confirmation by the Board. The Railway Board were authorised to delegate to the President or a Member the power of settling questions which might arise on any tour of inspection, such decision to be recorded subsequently as an act of the Railway Board. The Board was made subordinate and directly responsible to the Government of India in the Department of Commerce and Industry.

Railway Board Assumes Office

The Railway Board assumed office in March 1905 and was provided with a Secretary ; an Examiner of Accounts ; an Under Secretary, Construction ; an Under Secretary, Traffic; an Assistant Secretary, Establishment; a Registrar ; and a Director of Railway Construction.

Certain changes were made in the following year and the establishment then consisted of a Secretary ; three Assistant Secretaries, one each for Establishment, Construction and Traffic ; a Registrar, a Director of Railway Construction ; and a Railway Accounts Officer.

Robertson in his detailed recommendations had suggested that extended powers, both administrative and financial, should be delegated to the Boards of Directors of Companies, that the appointments of Consulting Engineers should be abolished and that the work which they had been performing under the Indian Railways Act should be entrusted to a body of Government Inspectors to be appointed for the purpose. These recommendations were given effect to in a modified form in 1908.

The next phase of the development of the railway organisation in India took place in 1919, when the Governor-General of India recommended to the Secretary of State that the Railway Board should be reorganised. It should consist of a President, two Members, and a Financial Advisor. While the President should undertake overall responsibility, the Members should be in charge of engineering and transportation matters, and the Financial Advisor, while remaining an officer of the Finance Department, would serve as a link between the President of the Board and the Finance Member of the Governor-General's Council. The story is carried forward in Chapter Sixteen.

NOTES AND REFERENCES

1. India Office Records by H. C. Hughes.
2. Railways of India : Davidson.
3. Ibid.

Annexure 10-A

Statement showing railways in India for which the Government have no financial responsibility

Name of railway	Length at end of 1902	Total of each class
1	2	3
(1) Railways financed by Companies without assistance from the Government of India	Miles	Miles
Barsi Light	21.59	
Bengal and North-Western (Company's section).	743.00	
Bengal Dooars extension	77.76	
Calcutta Port Commissioners	7.65	
Deoghur	4.79	
Karaikkal-Pooram	14.65	
Ledo and Tikak, Margherita Colliery	11.00	
Pondicherry	7.85	
Powayan Light	39.50	
Rohilkhand and Kumaon (Company's section).	53.92	
Sagauli-Raksaul	18.09	
Tarkeshwar	22.23	
Tarakeshwar-Magra	31.12	
West of India Portuguese	51.11	1,104.26
(ii) Railways financed by Companies with assistance in the form of a subsidy or guarantee from Local Bodies.		
Bengal Dooars	36.40	
Darjeeling-Himalayan	51.00	
Dibru-Sadiya	77.50	
Howrah-Amta	28.69	
Howrah-Sheakhala	19.75	
Nilgiri	16.90	
Ranaghat-Krishnagar	20.25	
Tanjore District Board (Mayavaram-Mutupet)	71.11	
Thaton-Duyinzaik	7.76	
Tezpur-Balipara	20.10	349.46

1	2	3
(iii) Railways financed by Companies with assistance in form of a rebate.		
Ahmedabad-Parantij	54.70	
Mymensingh-Jamalpur-Jagannathganj	53.37	
South Behar	78.76	
Southern Punjab	423.93	
Tapti Valley	155.48	766.24
(iv) Railways financed by Native States		
Bhavnagar Gondal Junagad Porbandar	334.19	
Bhopal-Itarsi (Native State section)	44.28	
Bhopal-Ujjain	113.27	
Bina-Goona-Baran	145.59	
Birur-Shimoga	37.92	
Cooch Behar	33.60	
Dhrangadra	20.83	
Gaekwar's Dabhoi	78.80	
Gaekwar's Mehsana	92.63	
Gwalior Light	126.14	
Hindupur (Yesvantpur-Mysore Frontier)	51.35	
Hyderabad-Godavari Valley	391.42	
Jammu and Kashmir (Native State Section)	15.92	
Jamnagar	54.22	
Jetalsar-Rajkot	46.21	
Jodhpur-Bikaner	700.29	
Kolar Gold-Fields	9.88	
Kalhapur	29.27	
Ludhiana-Dhuri-Jakhal	78.66	
Morvi	94.36	
Mysore-Nanjangud	15.80	
Nagda-Ujjain	34.32	
Nizam's Guaranteed State	330.13	
Parlakimedi	24.68	
Petlad-Cambay	32.42	
Rajpipla	37.37	
Rajpura-Bhatinda	107.05	
Shoranur-Cochin	64.83	
Udaipur-Chitor	67.40	
Vijapur-Kalol-Kadi	29.44	3,242.17
Total :	...	5,462.13 (8794 km)

Annexure 10-B

Statement showing Railways in India for which the Government have full financial responsibility.

Name of Railway	Length at end of 1902	Total of each class
1	2	3
	Miles	Miles
(i) Railways owned entirely by the Government.		
Amraoti	5.72	
Bezwada extension	20.58	
Bhopal-Itarsi (British section)	13.11	
Cawnpore-Burhwal (metre gauge link)	81.44	
Eastern Bengal State	891.31	
Godhra-Rutlam-Nagda	141.14	
Guntakal-Mysore-Frontier	119.50	
Jodhpur-Hyderabad (British section)	123.98	
Jorhat	30.25	
Khamgaon	7.89	
Lucknow-Bareilly	231.17	
Madras (North East line)	497.19	
North-Western	3,153.63	
Oudh and Rohilkhand State	1,037.53	
Rajputana Malwa	1,665.64	
Tirhut State	517.64	
		8,537.72
(ii) Railways purchased by Government from Companies but leased to the latter to work.		
East India	1,923.17	
Great Indian Peninsula	1,547.63	
South Indian	1,143.66	4,614.46
(iii) Railways promoted by Companies on the guarantee of Government.		
Assam Bengal	589.21	
Bengal Central	125.01	
Bengal Nagpur	1,553.58	
Bombay, Baroda and Central India	460.90	
Brahmaputra-Sultanpur	59.37	

1	2	3
Delhi-Umballa-Kalka	162.24	
Hardwar-Dehra	32.04	
Indian Midland	796.25	
Madras	888.10	
Mysore section (Southern Mahratta)	296.22	
Raipur-Dhamtari	56.24	
Southern Mahratta	1,042.04	6,061.2
Total	...	19,214 (30,935 km)

11

Railway Legislation

The first legislation on railways in India was passed within a year of the opening of the first lines. This was Act XVIII of 1854. It was applicable to railways in British territory and to those "under Government control" only. This practically did little more than give legal effect to regulations such as were then in force on English railways, as for instance the prepayment of fares, tickets, smoking, fraud, and the liability of companies as to luggage and valuable property belonging to passengers. The usual clauses as to carriage of goods, trespass, and obstruction were also included, and every railway was required to erect and maintain good and sufficient fences on each side of the line, and failing therein, to be liable to a fine of fifty rupees for every offence. That is how we find that some of the early lines were fenced, for instance the East Indian, the Great Indian Peninsula, Rohilkhand and Kumaon, Assam Bengal railways, etc, were fenced throughout, except some sections. But the Railway Board changed the policy in 1937, and since then only station yards, suburbs, industrial areas and immediate neighbourhood of level crossings have been fenced. The procedure for the recovery of fines and other penalties was laid down at length. The last clause required that a copy of the Act, of the general regulations, the time-tables and tariff of charges, should be published and exhibited in English and the vernacular of the district at all stations.

In a brief Act passed in 1871 (Act XXV of 1871), the question of cattle trespass was dealt with among some other minor matters, and previously to this, in 1870, another short Act had been passed giving certain requisite definitions of terms appearing in the Act of 1854. An important clause was inserted in the Act of 1871, by which "the officers, for

the time being entrusted with the control of a railway" (meaning the principal officer or agent of a company), should make "general rules and regulations for the use, working, and general administration" of a railway, and might vary these from time to time, but that all such rules, etc, should be submitted for the sanction of the Governor-General-in-Council, and when sanctioned, published for general information. Breach of such rules rendered persons liable to a fine not exceeding fifty rupees, or in default, to imprisonment which might extend to two months.

In 1875 an incident occurred on one of the Guaranteed Railways (the Oudh and Rohilkhand Railway) which led to a reopening of the question of further legislation as the point involved was important. A village near the railway line was set on fire by sparks from a locomotive engine, and the company was sued for compensation by one of the sufferers. Damages were decreed against the company, on the ground that it had no statutory powers to use locomotives on the line, and that, without such powers, it was liable for injury caused by engines in setting fire to adjoining property, or otherwise. The judgement was upheld on appeal in India, and the directors of the company contemplated a further appeal to the Privy Council. This was, however, deprecated by the Secretary of State, who said that the point would be dealt with in a new Railway Act.

But it was not until 13 March 1879 that a new Bill became law. Its provision extended to the whole of British India, and to the subjects of the Queen in Princely States, which was not the case in the earlier enactments. It came into force on 1 July 1879, the Acts of 1854, 1870, and 1871 being thereby repealed.

"Railway" Defined

The term "railway" was, under certain clauses, to cover lines under construction and a "railway administration" was to cover the case of managers of State lines, lines worked by Princely States or by Companies. The difficulty above referred to as to the powers to run locomotives, was dealt with in a short clause, making it lawful to use "locomotive engines, or other motive power," with the previous sanction of the Governor-General-in-Council. Under clause 5 no railway was to be opened for the public carriage of passengers until the railway administration gave notice of intention to open, until the line had been duly inspected by an officer appointed for the purpose, and until he had reported that the opening could be allowed without danger to the public. The clause did not apply to the opening of a line for the carriage of goods traffic. Rules were also laid down for reporting accidents, and the classes into which they should be divided, were defined.

As the Act of 1879 was defective as regards the inspection of railways, both before and after opening, it was found necessary to pass a short Act amending it in this respect in 1883. The provisions of Sections 5 and 5B of this Act enabled definite rules to be issued for the first time under legal authority in a resolution of Government, for the inspection of all railways instead of for State lines only prior to their being opened for passenger traffic. One month's notice was to be given, the inspecting officer was to be supplied at the same time with full imformation regarding the manner of construction of the line, and certificates were required to be given at the time of inspection :

(1) That no infringement in structures had been made of the standard dimensions prescribed for the gauge of the line by the Government ;

(2) That no engine or vehicle exceeded the prescribed maximum moving dimensions ;

(3) That no infringement of such dimensions would be made in future without due sanction ;

(4) That no more than two engines would ever be allowed at one time on any one track of a bridge ; and

(5) That no alterations in the loads of rolling stock which would involve live loads on bridges in excess of those which might from time to time be prescribed for the gauge by the Government would be permitted.

The description given above leads up to a stage preparatory to the Act of 1890. The principal features of the first draft of the Bill was the introduction of clauses allowing for the settlement of disputes between railways by means of arbitration. The Home Boards of the Guaranteed Railways viewed it from the point of the infringement of their rights under their contracts. As the Bill provided for a temporary and not a standing tribunal, composed possibly of Government officials, it was feared by the Guaranteed Companies that questions and disputes might not always be treated in the impartial and judicial way which characterised the proceedings of the English Railway Commission.

Act IX of 1890

The objections on the above grounds, together with the numerous proposals and modifications suggested from all sides, were disposed of ultimately by a Select Committee appointed for the purpose by the

Government of India, and on 21 March 1890 the Bill was passed as Act IX of 1890 and came into force later that year. The contrast between this and the standing Railway Commission in England was very clearly marked because of the anomaly that in the Indian Act the decision as to the necessity for appointing a Commission, as also the selection of its personnel, was left in the hands of the Government. This provision was subjected to much criticism at that time. As the owner of most of the lines, and copartner in others, the Government in India it was stated by critics, could hardly be regarded, from a legal point of view, as able to exercise strictly impartial judgement in this important matter, more particularly if, as might well happen, the case to be dealt with was one in which the interests of the State were involved. Another opinion was that although this view might be advanced theoretically, it was not likely that there would be the slightest ground for apprehension on this score, should it be found necessary to put in force this portion of the Act.

Sections 23 and 24 of the fourth chapter of the Act IX of 1890, gave the Government power to close a railway for traffic if it was held to be unsafe, and to forbid the use of rolling stock on similar grounds. The third chapter was practically new. It laid down the powers and responsibilities of railway administrations as regards the construction and maintenance of the lines and the provision of accommodation works. The absence of enactment on this latter point had been much felt by both the railways and the public, more especially regarding road crossings of a railway, either on the level or by over or under bridges. The fourth chapter, relating to the opening and closing of railways for traffic, referred only to passenger traffic. For goods traffic a railway administration could open a line on its own responsibility. Section 22 was amplified by detailed rules for inspections, and for the procedure to be followed with regard to them.

The fifth chapter was wholly new. It established Railway Commissions for the settlement of disputes or claims between companies, or between them and the public, and provided for what are known as "traffic facilities." The provisions were largely copied from "The Railway and Canal Traffic Act" of 1888 of the United Kingdom, the prominent difference being that the Indian Commissions were to be merely temporary tribunals, as already mentioned and were to be appointed as occasion may require, and only if the Governor-General-in-Council thought fit.

Chapter Seven defined the responsibilities of railways as carriers, and Section 82 exempted a railway administration from responsibility for loss or damage in case of contracting to carry by sea, under the conditions of the ordinary bill of lading. The eighth chapter prescribed the duties of a railway administration in the case of accidents, and under Section 84 detailed rules were laid down defining the duties of all concerned and the classes of accidents which were to be recognised.

Chapter nine dealt with penalties and offences of railway companies, railway servants, and travellers or traders. In Section 87 to 98, penalties were laid down in respect of railway companies only, thus excluding the officials of State lines, whose misdemeanours were obviously to be dealt with by Government.

As soon as the Bill became law, four of the companies, three of them being the only remaining of the old Guaranteed Companies, lodged protests with the Secretary of State against the infringements of their rights, and declared, under legal advice, that the passing of the Act, as applicable to the Guaranteed Companies, was ultra vires on the part of the Governor-General-in-Council. Their principal objection was to chapter five of the Act, which dealt with the subject of traffic facilities, undue preference, and the institution of a Railway Commission for the settlement of claims or disputes arising from these subjects.

In replying to this in 1891, the Government of India took a firm position. They did not accept the view that the Act was ultra vires, and considered that unless it could be shown that very unreasonable interference with the companies' contracts had been enacted, the companies had no reason to complain, and that Government were satisfied that no such interference could be shown, or was likely to occur.

The application of the Act to railways belonging to or passing through the Princely States was a matter of greater difficulty and delicacy. In the case of a railway wholly isolated in one State, the Government of India had no direct concern, other than as the paramount power with what was in fact an administration within foreign territory. But when, as in many cases, such lines formed part of through routes, it became evident that civil and criminal jurisdiction for damage, or offences under the Railway Act, 1890 must be with the Government of India, and more particularly when a line passed through several contiguous States. After considerable negotiation, conducted with nearly every Princely State, this end was attained.

The general tenor and perhaps intention of railway legislation in India has been to follow more or less closely the example of the United

Kingdom in this respect, and there are but few indications either in the enactments or in the proceedings of the Government, of any desire to go beyond this, or to regard the circumstances and habits of the people as requiring any special treatment, whether of restraint or protection in their dealings with railway administrations. If we bear in mind the position of the Government of India as the owner or potential owner of the whole of the Indian Railways, and remember that it held far closer and more defined relations with the people than was the case with any European Government, while possessing the complete initiative in legislation, we may be surprised that it was not been tempted to venture on exceptional measures. This absention was to be accounted for, however, in great degree by the fact that the Government was possessed of ample executive power in the control of its railways, and that thus many matters which elsewhere might need to be supported by legal sanction, were dealt with promptly and easily by a circular or resolution of the Supreme Government.

Indian Railway Board Act 1905

According to the provisions of the Indian Railways Act 1890, the executive authority in connection with the administration of Railways vested in the Central Government and by virtue of the delegation made under section 2 of the Indian Railway Board Act of 1905, all the functions and powers of the Central Government, under the Indian Railways Act of 1890 were to be exercised by the Railway Board.

The Acworth Committee, 1921 examined the relations between the railways and their customers and concluded that the railways possessed too much freedom in fixing rates and fares and the mere fixation of maximum and minimum rates by the Government was not at all a sufficient safeguard for the traders against undue preference. The Committee, therefore, recommended the establishment of a rate tribunal in India to adjudicate disputes between the railways and the public regarding rates and fares.

The Railway Rates Advisory Committee

The Government of India however, did not accept this recommendation of the Acworth Committee, as the constitution of a body empowered to pass final decision on points referred to it would involve an amendment of chapter V of the Indian Railways Act, and as Government were responsible for a commercial return from railways, it was not proper to have a rates tribunal exercising control over rates in the sense of fixing such rates.

The matter was discussed with the Central Advisory Council for Railways in 1923 and after prolonged consideration, the Government of India set up in 1926, the Indian Railway Rates Advisory Committee. The Railway Rates Advisory Committee was merely an advisory body whose findings may be accepted by Government or not. It consisted of a president, one member representing commercial interest and one member as representative of railway interest.

The Indian Railway Rates Tribunal

Rail users were dissatisfied with the constitution of the Rates Advisory Committee, as its scope was very limited and its recommendations were not binding on the railway administration. It was widely felt that nothing short of a judicial body with extensive powers of calling evidence and modifying rates and fares could satisfactorily meet the desire of the Indian public. There was thus a pressing demand both in Parliament and outside for the establishment of a statutory railway rates tribunal on the model of the British Rates Tribunal or of the Interstate Commerce Commission of U.S.A. with mandatory powers.

In order to satisfy this persistent demand of the public, a Railway Rates Tribunal was constituted by the Government of India under the Railway Amendment Act of 1948 and the Tribunal began to function from 4 April 1949 as a judicial body for settling disputes relating to railway rates arising with the public.

The Tribunal consisted of a president and two members appointed by the Central Government. Only persons who were eligible to be appointed as High Court judges could be members of the Tribunal. There was one condition however, that the members should not represent any interest and should act like an independent jury, it being essential in the interest of justice and fairness that the Tribunal should be constituted of independent judicial members who would inquire impartially into the matters in dispute. The Tribunal was given the power to seek the help of experts and assessors in deciding disputes.

The constitution of the Railway Rates Tribunal was able to remove the various defects of the Advisory Committee, yet it was not absolutely free from criticism because there was no representative of the railway customers on the Tribunal. It was given power to hear and decide the following types of complaints against the railway administration :

(i) Charging of unreasonable rate or rates which are unreasonable by reason of any condition attached to them regarding minimum weight, packing, assumption of risk or any other matter ;

(ii) Levying of unreasonable charges, excluding terminal charges which are or may hereafter be standardized.

(iii) Refusing unreasonably to quote a new station-to-station rate; and

(iv) Placing a commodity in an unreasonably higher class.

The jurisdiction of the Tribunal was restricted to goods freight only and it had no power in respect of scales of charges levied by railway administration for the carriage of passengers and their luggage. parcels, and demurrage charges, etc., except when a reference has been made by the Government. It could not increase or reduce the level of class rates, scheduled rates, terminal and other charges, and classify any commodity which had not been classified before. Similar bodies in foreign countries had these powers.

For instance, the Railway Rates Tribunal of Great Britain had been given wide powers under the British Railway Act of 1921. These powers included those of altering the classification of merchandise, of varying or cancelling through rates, instituting, modifying or cancelling existing rates, determining the reasonableness of railway requirements etc.

In the U. S. A, too, the Senate directed the Inter State Commerce Commission, with due regard "to the maintenance of an adequate system of transportation, to investigate and effect with the least practicable delay such lawful changes in the rate structure of the country as will permit the freedom of movement by common carriers of the products of agriculture............ including live-stock, at the lowest possible rates compatible with the maintenance of adequate transportation service."

The Railway Freight Structure Enquiry Committee 1957 was, therefore, asked by the Government of India to examine the constitution, jurisdiction and procedural rules of the Railway Rates Tribunal and to suggest how the Tribunal could be made a more effective and expeditious instrument for adjudication on railway freight matters.

The Railway Rates Tribunal Revamped

Introducing in the Lok Sabha on 28 November 1957, the Indian Railways (Amendment) Bill 1957, the Union Minister for Railways, Shri Jagjivan Ram said, "There has been a public feeling that the Railway Rates Tribunal as now functioning has tended to be too formal and legalistic in its approach and that proceedings before it have been unduly prolonged and expensive. The Railway Freight Structure Enquiry Committee which was

set up in the year 1955, was, therefore, asked to examine what changes were needed in the existing constitution, jurisdiction and rules of procedure of the Railway Rates Tribunal, so that the Tribunal might be a more expeditious instrument for adjudication of railway freight matters at a reasonable cost to the litigant. The recommendations made by the committee relating to this matter have been examined and it is proposed to suitably amend the Indian Railway Act, 1890, in regard to the constitution and jurisdiction of the Tribunal. The present Bill seeks to achieve this object. Except a few minor changes, practically all the recommendations of the Freight Structure Enquiry Committee were accepted and the new Railway Rates Tribunal was constituted under the Indian Railways (Amendment) Act of 1957".

The new Tribunal consisted of a chairman and two other members appointed by the Central Government. The chairman was to be a judge of the Supreme Court or of a High Court and the two members were to be persons having special knowledge of commercial, industrial or economic conditions of the country or of the commercial working of the railways.

Its Jurisdiction and Functions

If any complaint arose that a railway was charging for the carriage of any commodity between two stations a rate which was unreasonable or was levying any other charge which was unreasonable, the Tribunal may fix such rate or charge as it considered reasonable provided that the rate to be so fixed should be within the limits of the maximum and minimum rates fixed by the Central Government.

The Central Government kept to itself power to classify or re-classify any commodity and to increase or reduce the level of class rates and other charges. The Tribunal had no jurisdiction in respect of (i) classification or re-classification of any commodity, (ii) fixation of wharfage and demurrage charges including conditions attached to such charges, and (iii) scales of charges levied by a railway administration for the carriage of passengers and their luggage, parcels, military traffic, and traffic in railway materials and stores.

The new Railway Rates Tribunal thus became a much more effective machinery than the previous one for adjudication of disputes in regard to railway freight rates, but according to public opinion its scope was still limited. There was a demand for a statutory organization on the model of the Inter-State Commerce Commission of U. S. A., which is a powerful and impartial statutory judicial authority created by law for the regulation of all forms of transport---railway, road or water transport—and in which all regulatory powers are centred with respect to rates, services and co-ordination of all modes of transportation in the country.

12

Twentieth Century-The British Period

Network and Capital Expenditure

As the story of the Indian Railways enters the twentieth century, it will be appropriate to take stock of the development of the network, the capital invested, traffic handled and earnings therefrom. Between 1880 and 1900, a span of two decades, the mileage of railways in India open to traffic increased from 9,325 (15,013 km) to 24,760 (39,864 km).

The total capital expenditure, both on open lines and those under construction at the close of the calendar year 1900 was Rs 343 crores. The details will be found in Annexure 12A. The railways in India carried in that year 176 million passengers and lifted 44 million tons of goods. Their total traffic earnings were Rs 31.59 crores. The working expenses, were Rs 15.13 crores, leaving net earnings equivalent to Rs 16.46 crores which yielded a percentage of 4.99 on the capital outlay.

By way of ownership and management, six different systems comprised the network ; lines owned by the State, but managed by companies, lines owned and managed by the States; lines owned and managed by Guaranteed Companies ; companies assisted by the State or local bodies ; lines owned by Princely States and worked by companies; and lines owned and managed by the Princely States. There were, in addition, two short foreign lines in Portuguese and French territories, namely, the West of India Portuguese Railway and Pondicherry Railway. There was a total of 90 railways under these six systems.

It will be recalled that under the terms of contracts with the old Guaranteed Railways, an option was available to the Government of India

to purchase the lines after 25 or 50 years in accordance with their contractual rights as laid down in various agreements. When the contracts with those companies expired, Government in most of the cases exercised its right of terminating them. In some cases like the East Bengal, Oudh and Rohilkhand and the North-Western Railways, the lines were purchased and transferred to State management, while in other cases, like the East Indian and the Great Indian Peninsula Railways, the lines were acquired by the State but handed over to the same companies for management under revised contracts.

The Railways constructed in India during 1869 to 1879 belonged to the State from the very beginning and were managed by the State. Railways constructed under the new guarantee system too were from the beginning the property of Government, though the companies were given a certain guaranteed interest on the capital invested and were allowed to manage the lines.

Branch Line Rebate Companies

Pressure had been building up both from internal factors as well as external sources for the continuous expansion of the network. The internal factors were the military requirements and the fear of death and starvation due to famine and among the external factors were the necessity felt by the Secretary of State for India "for greater expedition in pressing on some of the projects towards speedier completion." In a despatch he sent to the Government of India in September 1890, he stated, "It appears to me that, for various reasons, political and economical, the rate of progress in the development of the Railways with advantage, be accelerated." The Secretary of State's counsel was motivated by two considerations : namely the strategic needs of the Indian Empire and pressure from British investors who had found construction of railways in India an attractive proposition.

The first of these two considerations also exercised the minds of the British officers in India, including those serving the railways. At about the same time as the Secretary of State sent the despatch referred to in the preceeding paragraph, the Director General of Railways recorded a note that public finances of India could be strengthened by increasing the trade of the country and this in turn could not be achieved without the construction of commercial lines.

The second consideration, that is, investment of British capital in the construction of railways in India, had led to the offer made by the Government of India in 1893 of rebate terms to encourage the construction of branch lines. These concessional terms were applicable to lines not exceeding a hundred miles in length, or to mountain railways. Robertson[1]

gave strong support to the scheme as at the time of his submitting his report in 1903 the total mileage of branch lines "suggested by local government and others" that required to be constructed was 13,187. In 1910 the terms were revised by the Government of India and it promulgated afresh on 23 June of that year "the conditions on which the Government of India will be prepared to receive applications for the grant of financial assistance to companies formed to provide capital for the construction of such branch railways as Government may be prepared to entrust to companies." (Annexure 12 B). These terms provide, amongst other concessions, for an increase in the rate of guarantee from 3 to 3½ per cent and of rebate from 3½ to 5 per cent, with equal division of surplus profits in both cases. They also give the State the right to purchase before the full contract period in certain eventualities.

The main features of the new terms were provision of land free of charge, supply of rolling stock by the main line, a guarantee of 3½ per cent on the capital outlay by the company, or a rebate, equal to a sum not exceeding the net earnings from traffic interchanged between the main line and the branch, so that together with the net earnings of the branch line, it should make up an amount equal to interest at the rate of 5 per cent on the capital expenditure by the company. A rebate and a guarantee of interest could not be granted to the same branch line. An important provision of Branch Line Terms of 1910 was that "the capital of a company must be expressed in rupees and subscription must be invited only in India."

Under the Branch Line Rebate Terms, Government sanctioned the construction of a number of branch lines. While the beneficiaries in the earlier years were companies formed by English contractors registered in India, in later years, in the first quarter of the twentieth century, some companies floated by Indians were also granted this concession. By 1918, such companies had constructed 22 branch lines aggregating to a total length of about 2,000 miles (3,220 km). So the Rebate Terms proved an incentive for the expansion of the railway network. The working results of these branch lines showed that both the main and the branch lines gained financially.

Purchase of the GIP Railway Company

On 21 December 1900, Government had purchased the Great Indian Peninsula Railway on an agreed price payable in the form of terminable annuity upto 17 August 1948. The contract, current for a period of 25 years, provided for the amalgamation with the Indian Midland Railway Company, which was to form a part of the GIP Railway.

Salient features of the contract will be found in Annexure 12C. The Indian Midland was purchased by the State in 1910.

We have already noticed in Chapter Eight that the property owned by the old guaranteed East Indian Railway Company was purchased by the State on 31 December 1879 and the line was worked by a reconstituted company. Under the revised contract entered into with the reconstituted company with effect from 1 January 1880, the State was assured of a larger share of the profits than was received by it under the previous arrangements. The revised contract under which the railway was leased to the Company for a term of 50 years also provided that it would be determined on 31 December 1919 or five years later. Towards the end of the World War I, public demand for the acquisition of State-owned railways from the management of non-Indian companies had gathered strength. It was therefore decided to determine the 1880 contract on 31 December 1924. The Railway was taken over for direct management by the State from 1 January 1925.

Re-arrangement of Railways in Southern India

The contracts of the Southern Mahratta and Madras Railway having approached their period of termination, Government decided to take advantage of the opportunity and to re-arrange the railway system in Southern India. The Southern Mahratta absorbed the whole of the Madras Railway with the exception of the Jalarpet-Mangalore section and branches thereof and took over the Katpadi-Dharmavaram and Pakala-Gudur sections from the South Indian Railway. Madras Railway was purchased by the State in 1908.

The South Indian Railway acquired the Jalarpet-Mangalore section of the Madras Railway and branches thereof. These arrangements were carried out on 1 January 1908 and the name of the enlarged Southern Mahratta Railway was changed to Madras and Southern Mahratta Railway. The Shoranur—Cochin Indian State line was on the same date transferred from the former Madras Railway Company to the South Indian Railway Company for working. The Tirupattur-Krishnagiri and Morappur-Hosur narrow gauge lines were dismantled on 1 August 1941 and 1 November 1941 respectively.

All the major lines had been purchased by Government by 1910 and leased for purposes of management to private companies ; the companies operating railways in India could therefore no longer be characterised as private enterprises in the true sense of the term. With a nominal capital outlay and guaranteed interest thereon, they were only managing agencies working the lines for the Government of India. In 1920, the Government

of India owned 73 per cent of the total mileage of the country. If the lines owned by the Indian States are excluded, private companies accounted for only 15 per cent of the total mileage of 37,029 (59,617 km). In spite of this predominant State proprietorship, the Government managed only 21 per cent of the railway system, while the companies managed 70 per cent. These arrangements continued to be the subject of strong public criticism in India.

Fresh Impetus to Development—Mackay Committee

From time to time in the first quarter of the twentieth century, the question of the expansion and development of the Indian Railways system came under scrutiny, and commencing with the enquiry by Robertson, described in Chapter Ten, several others followed. In 1907, the Secretary of State appointed the Mackay Committee to enquire and report, among other things :

> Whether the amounts allotted in recent years for railway construction and equipment in India are sufficient for the needs of the country and for the development of its trade.

A fresh impetus was given in 1908 when the Mackay Committee recommended an annual programme of £ 12,500,000 for capital expenditure on railways subject to periodical revision. Railway mileage in India increased from 24,752 (39,851 km) in 1900 to 34,686 (55,844 km) in 1914 and the capital outlay from Rs 329.53 crores to Rs 495.05 crores.

Another notable characteristic of this period was the commencement of railway profits in 1900. The losses to the state during the first 40 years amounted to Rs 58 crores. From 1900, however, railways began to yield a net return on the capital-at-charge, mostly due to the general economic development of the country and the renewal of the original contracts with guaranteed companies under terms more favourable to the State. These profits were, however, subject to remarkable variation from year to year depending on the agricultural position and on the course of internal and external trade of the country.

World War I placed the Indian Railways under a heavy strain, caused by the transportation of troops and war material on high priorities. India was also called upon to meet heavy demands for staff and material for railways in East Africa and elsewhere. Upto 31 March 1916, foreign expeditionary forces had been supplied with 50 locomotives, 600 vehicles, 165 miles (265 km) of rails and fastenings and half a million sleepers. Railway workshops were made to divert their resources to the production of high explosive shells, hospital trains and other war equipment. Indian railways emerged from the war in a battered and dilapidated condition. Rolling-stock and other operational equipment were in a state of disrepair.

The railways were short of stock and many locomotives had long passed the age of superannuation. Workshops were so overcrowded that they were incapable of handling increased repairs. Speed was reduced owing to the worn-out track and ageing locomotives. All this naturally led to the restriction of passenger services, congestion in trains, serious curtailment in the carrying of goods and commodities, unjustifiable economies in maintenance, repair and amenities, leading to wide public discontent and dissatisfaction.

Acworth Committee

Indian public opinion as represented in the Imperial Legislative Council, had unanimously urged in repeated resolutions in 1914, 1915, 1917 and 1918, the appointment of a committee to enquire into the desirability of adopting direct state management. In response to this demand the East India Railway Committee, with Sir William Acworth as Chairman, was appointed in November 1920 "to recommend suitable methods of management, to examine the functions, status and constitution of the Railway Board and the system of Government control over the Railway administration, to consider arrangements for the financing of railways in India, and to make such other recommendations that may seem germane to the enquiry."

This was the first time that the issue of the methods of management came to be prominently raised in relation to Indian Railways. The system had by now grown to 37,029 miles (59,617 km). A network so large, built up by bits and pieces over a period of 70 years and joined together to no conscious design, cried out for unified management in the modern sense, that is, a management conscious of objectives, planning, programmes and motivation.

But the Acworth Committee was not primarily concerned with these issues ; rather it had to grapple with more basic problems, such as the extension of the sphere of state management to 70 per cent of the lines, which were still under company management, merits and demerits of a single central authority or several decentralised authorities, and the degree of autonomy that the central authority, if one was acceptable, should enjoy.

Two major changes followed the recommendations of the Acworth Committee. First, Government gradually took over the management of the railways ; and second, railway finance was separated from the general finance of the Government of India.

"A large section of Indian public opinion supported the adoption of the system of State management," remarked the Committee "because they

believe that company management does not encourage the development of indigenous industries by sufficently favourable treatment ; that it gives preferential treatment to import and export goods ; that under the present system of company management large profits are made by British Interests ; and that hitherto the companies have not employed Indians in higher appointments, except to a very limited extent, and have not granted them adequate facilities for technical training." "There is also in addition." averred the members, "a positive feeling caused by an awakened national self-consciousness that Indians should have more control of the management of railways in their own country." On these and other grounds, the Committee recommended unequivocally in favour of state management and one Central authority.

Besides recommending greater autonomy in administration, the Committee introduced a new emphasis on the commercial character of the railway undertaking, and the importance of operating railways on business principles. The Committee was of the view that most of the defects and shortcomings attributed to the Indian Railway system were due primarily to the failure of Government to provide railways with adequate funds for capital expenditure on development and extensions, and even for essential operations, renewals and repairs. These defects, observed the Committee, "were the inevitable results of a system which has not been adapted and developed to meet the requirements of what is essentially a commercial enterprise of the first magnitude."

The Committee felt that the railways had continued to earn during the previous 20 years enough money to meet their ordinary requirements and had the Railway Budget been separate from the General Budget "there would have been no difficulty in providing all the money the railways needed to keep up their programme of growth and development." The Committee found it "impossible to say" as to how much the economic development of India had suffered, not from hesitation to provide for the future, but from the utter failure even to keep abreast of the day-to-day requirements of the traffic actually in sight and clamouring to be carried."

"We cannot think," the Committee concluded, "that even the war is sufficient to explain the treatment of Indian railway revenues in the last few years." The Committee, therefore recommended that the railways, in future, should have a separate budget of their own and assume the responsibility for earning and expending their own income.

Acting on the recommendation of the Committee the Government of India took up actively the rehabilitation of the property, the Legislative Assembly agreeing in the March session of 1922 to spend a sum of Rs 150 crores during the five year period 1922-27. The first step in reorganising

the central administration was taken in November 1922 when a Chief Commissioner of Railways was appointed and entrusted with the duty of recommending the form of new organisation.

The railway administrations had prepared their programmes for rehabilitation and improvement and many important works which had been deferred were at once put in hand. Two difficulties however confronted them. In the first place their personnel and organisation had been kept down to a minimum during the war period, and the machinery did not exist for spending on the scale now found possible, and secondly the fluctuations in prices both of labour and material which resulted from the economic disturbance caused by the war rendered old estimates unrealistic. The programmes of new works designed for the purposes indicated by the Acworth Committee were consequently somewhat hastily put together and in many cases were such as had subsequently to undergo wholesale revision.

The Inchcape (Retrenchment) Committee

At this time the railway administrations were further suffering from disturbed and abnormal economic conditions, which on the one hand tended to contract the volume of traffic moving, and on the other to increase the cost of transportation to a point never previously thought possible in India. There was in consequence a considerable deficit in the working of railways in 1921-22. The unbalanced state of the central finances led to the appointment of the Retrenchment Committee presided over by Lord Inchcape. This committee included in its examination the whole question of railway finances.

The recommendations of the Inchcape Committee were directed towards economies in working and circumspection in spending. They recommended, first, an immediate and drastic cut in working expenses ; secondly, the institution of a depreciation fund ; and thirdly, the adoption of the principle of so working the railways as to produce a fixed profit to the State. While the first two recommendations have been the sheet anchor of railway strategy to overcome financial difficulties and are valid as much today as they were 60 years ago, the third recommendation, relating to the production of a fixed profit to the state, broke fresh ground in the financial administration of the railways. The implementation of this principle has however, repeatedly eluded the railway administration's best efforts.

The basic strategy for ensuring solvency has remained unchanged over the last half century. Even in 1923, the efforts of the railway administration were concentrated on three main stages of work. The first stage envisaged the elimination of unnecessary expenditure, including reduction of staff, economy in the use of materials, like fuel, curtailment of standing charges and prevention of losses due to theft and damage of goods in

transit. The second stage required introduction of better methods of equipment utilisation, whether in the actual handling of traffic or in maintenance and renewals. Most fruitful in this stage were the efforts in the marshalling yards and the control of train movement, accompanied by improvements in time-tabling and in the overhaul of locomotives and rolling stock. The third stage covered larger measures for economy, like reorganisation of administrative and executive machinery, modernisation of workshops, construction of works designed for improvement of sectional capacity, electrification and mechanical handling. The railway administration of the twenties was conscious, that the first stage, which involved reduction of staff and conservation of stores, particularly fuel, and elimination of losses to goods in transit had certain limitations, and the second and the third depended on intensive supervision, continuous effort towards improvement, scientific treatment of the whole problem of transportation, and the proper planning and expeditious execution of works to attain the desired improvement.

There was in this, an awareness of the need for husbanding resources for effecting economies and exercise of control and coordination at various levels of management. Railway administration in India had, by now become management conscious with the stress on planning, programming, control and coordination in order to secure certain well defined objectives.

Following the recommendations of the Acworth and the Inchcape Committees, a Chief Commissioner for Railways was appointed in November 1922 and entrusted with the task of recommending the form of the new administrative organisation for the railways. The necessity for exercising financial control from within the organisation, instead of from without, was recognised and a Financial Commissioner was appointed and made a Member of the Railway Board, with direct access to the Finance Member of the Governor-General's Council. The work of the railway department was divided, under the orders of the Chief Commissioner, among the Financial Commissioner and two other members of the Board on the basis of financial, technical and general subjects. On the field, Government accelerated the process of take-over of major lines.

Government Take-over of Major Lines

The first contract of the Bengal Nagpur Company was to expire on 31 December 1913, but in November 1912, the Secretary of State modified that contract and extended it to 31 December 1950. The South Indian Railway's contract of 1890 was revised in 1909 and the lease was extended to 31 December 1945. The BB & CI Railway Company's revised contract, execute

in April 1907 was revised in October 1913 and the lease was extended upto 31 December 1941.

The East Indian and the GIP were taken over by Government in 1925: B.B & C. I. and Assam Bengal in 1942; Tirhut and Lucknow-Bareilly in 1943 ; and Madras and Southern Mahratta, Bengal Nagpur and South Indian in 1944. In 1925, the State-managed Oudh and Rohilkhand Railway. originally known as the Indian Branch Railway Company was amalgamated with the EIR, while the Jabalpur branch of the latter was transferred to the GIP. Also the Ghaziabad-Delhi-Kalka section was transferred from the EIR to the North Western Railway. The State had by 1944 come to be the owner of all trunk lines and brought them under State management.

Years of Prosperity

The first six years after the adoption of the Convention instituting a separate budget for Railways witnessed the introduction of a series of other far-reaching changes in finance and organization. A Depreciation Fund was set up. The administration set up of individual railways was also overhauled and in the case of the larger systems, particularly the North Western and the East Indian, the Divisional system, which is discussed in a later chapter, was introduced. A more progressive policy designed to improve the conditions of railway labour was also adopted. Systematic programmes of open line improvements and new construction were drawn up and a substantial addition was made to the route mileage. The capacity of some intensively worked lines was increased by doubling and quardrupling. The programme of rehabilitation included improvement of the permanent way, strengthening of bridges, remodelling of yards, new station buildings, more staff quarters, etc. Several workshops were expanded and their equipment strengthened.

As railway revenues were high after meeting operating expenses and appropriation to the Depreciation Fund, a handsome surplus was left to meet the contribution to the General Revenues of Government and to build up a Reserve Fund. The financial results of State owned Railways during 1924-30 are summarised below :

	(In crores of rupees) (average)
Gross traffic receipts	101.22
Operating Expenses	53.40
Depreciation Fund	11.31
Net traffic receipts	36.51

Net miscellaneous receipts	.80
Net revenue	35.71
Interest charges	26.94
Surplus	8.77
Contribution to General Revenues	5.98
Railway Reserve Fund	2.79

During the boom period, 1924-30, about 4,000 miles (6,440 km) of line were added to the Indian railways' network and an important addition was the opening of the Kazipet-Balharshah section of His Exalted Highness the Nizam's Guaranteed State Railways. The latter provided a more direct broad gauge route between Northern and Southern India, reducing to 1,361 miles (2191 km) the distance from Delhi to Madras as compared with 1,569 miles (2526 km) by the Manmad-Raichur route.

The Slump of the 1930s

The years of prosperity came to an unexpected and abrupt end with the world wide slump which commenced in 1931, following the Wall Street Collapse of 1929, Railway receipts, following the general depression in agriculture, industry and trade, dropped steeply and retrenchment of staff had to be enforced to keep down further losses. Not only were contributions to the General Revenues suspended, but the balances in the Reserve Fund were also wiped out within a year or two, and the Depreciation Fund had to be raided in order to meet the interest charges on capital.

During 1930-37, net traffic receipts fell to an average of Rs 25.93 per annum from Rs 36.51 crores during the boom period; interest charges went up from 26.94 crores to Rs 32.18 crores; and the surplus was reduced from Rs 8.77 crores to Rs 5.77 crores.

On 1 April 1937, Burma was separated from India and the Burma Railway also parted company with the Indian Railway system. Burma had by this time 2,060 miles (33166 km) of metre gauge railway. After this separation, the mileage of Indian Railways was reduced to 41,076 (66,132 km).

Introduction of Electric Traction

A significant development during this period was the introduction of electric traction on Indian Railways. On 3 February 1925, the first electric railway—the Harbour Branch section of the Great Indian Peninsula Railway from Victoria Terminus to Kurla—was declared open. Soon afterwards, the Great Indian Peninsula suburban line was electrified upto Kalyan

and the main line upto Poona and Igatpuri over the Bhore and the Thal Ghats. The Bombay, Baroda and Central India suburban line was later extended upto Borivali and Virar. Work on the Madras suburban railway was started in 1928 and completed in 1931.

Electrification of suburban railways operating at 1500 volts dc system, involved enormous capital outlay and expenditure. During this period, large amounts of money were spent on doubling and quadrupling the track in many places, strengthening and even rebuilding some of the bridges, remodelling station yards, reorganising and improving workshops, covering platforms or building new ones, building additional refreshment stalls and lower class waiting rooms, and on improving sanitary arrangements. Large amounts were spent on constructing, renovating or making additions to several station buildings.

World War II

The traffic demands of World War II brought prosperity back to Indian Railways and increased earnings commenced from 1939-40 resulting in surpluses which more than made up for the loans previously taken from the Depreciation Fund to meet deficits in the thirties and pay off the contributions then suspended. World war II inflicted great wear and tear on the railways. The attrition of assets due to intensive use and postponement of renewals, and even of essential maintenance in many cases due to lack of resources, left Indian Railways by 1945 in an even worse state than they had been in 1918.

When they emerged from the depression in 1937, the Railways faced the problem of overtaking the arrears of maintenance and replacements since 1931. But the outbreak of the World War II in 1939 interrupted this process as overseas sources of supply diverted their production to meet the exigencies of the war and mobilised all their resources for the war efforts. During the first phase of the war, Indian Railways were called upon, despite their accumulated deficiencies and difficulties, to release locomotives, wagons and track material for the Middle East, the responsibility of which had been allotted to the Indian command. Over 8 per cent of metre gauge locomotives and 15 per cent of metre gauge wagons of Indian Railways, as well as 4,000 miles (6,440 km) of track and 4 million sleepers were released for military purposes. This necessitated the dismantling of 26 branch lines as well as the curtailment of services on many others.

Later, India had become the base for mounting a major offensive against Japan and thus, the load on the railways increased still further. A larger number of railway workshops were diverted to the manufacture

of munitions while the maintenance and renewal of railway equipment received little attention. The continuous strain imposed on the Indian Railways by demands for heavy military movement drove them almost to a breaking point. Enormous arrears of renewals and replacements accumulated and indigenous facilities for rehabilitation were appreciably reduced or incapacitated, by the mobilisation of workshops equipment for the war effort.

NOTES AND REFERENCES

1. See page 150.

Annexure 12-A

Mileage and Capital Expenditure on Railways in India upto the year 1900

	MILEAGE		OUTLAY	CAPITAL
	Open	Under Construction	Total	Rs.
Guaranteed railways	1,334.07	31.09	1,365.16	25,09,12,401
State lines worked by Companies	13,441.25	1,118.18	14,359.43	1,97,00,87,374
State lines worked by the State	5,125.32	192.56	5,317.88	81,45,07,947
Assisted Companies	2,350.25	69.75	2,420.00	17,62,52,519
Native State lines	3,048.60	144.82	3,193.42	17,13,95,126
Lines in Foreign territory	73.61	...	73.61	1.76,34,352
Total Open Lines and Lines partly open	25,372.10	1,556.40	26,929.50	3,40,07,89,719
Railways wholly under construction	......	569.78	569.78	1,43,43,513
GRAND TOTAL	25,373.10	2,126.18	27,499.28	3,41,51,33,232
Unclassified expenditure, including surveys and collieries	—	—	—	1,82,64,157
GRAND TOTAL CAPITAL OUTLAY IN INDIA	—	—	—	3,43.33,97,389

Annexure 12-B

Appendix 28
No.105-R.P. of 1910
GOVERNMENT OF INDIA
RAILWAY DEPARTMENT
(RAILWAY BOARD)
Simla, the 23rd June 1910.

Terms on which the Government of India are prepared to consider offers for the construction by the Agency of private companies of branch lines forming feeders either to State lines worked by the State or to railways worked by companies.

RESOLUTION. The conditions on which the Government of India will be prepared to receive applications for the grant of financial assistance to companies formed to provide capital for the construction of such branch railways as Government may be prepared to entrust to Companies.

2. The conditions on which concessions for the construction of branch lines will be granted are as follows :—

(i) The capital of the company must be expressed in rupees, and subscription must be invited only in India.. ......

(ii) ....

(iii) All land in British Territory. which is, in the opinion of the Government of India, required for the construction of the line, will be provided free of charge, including land permanently or temporarily required for quarrying ballast, for brick-fields and similar purposes.

(iv) ... ...

(v) ... ...

(vi) ... ...

(vii) The Government of India will grant financial assistance to companies either in the shape of a guarantee of interest on capital expenditure, or of a rebate to the branch line Company from the net earnings of the main line from traffic interchanged with the branch.......

(*a*) *Guarantee of Interest* :—The Government of India will be prepared to guarantee from the close of the period during which interest is payable out of capital fixed minimum dividend of $3\frac{1}{2}$ per cent on the actual capital expenditure on the railway to the end of the year in respect of which

the dividend is declared, subject to the condition that all surplus profits which may be earned by the company in excess of 5 per cent shall be equally divided between the Government and the Company.........

(*b*) *Rebate* :— When the branch line connects with a railway owned and worked by the State, the Government of India will be prepared to allow the Company by way of rebate, such a sum not exceeding in any year the net earnings from traffic interchanged between such State railway and the branch line, as shall together with the net earnings of the branch line, make up an amount equal to interest at the rate of 5 per cent per annum on the actual expenditure charged to the capital account of the Company.

(viii) ... ...

(ix) ... ...

(x) ... ...

(xi) ... ...

(xii) ... ...

(xiii) ... ...

(xiv) ... ...

(xv) ... ...

(xvi) The Government of India reserve the right to fix and vary from time to time the classification of goods for tariff purposes, and the maximum and minimum rates for such class of goods and for passengers. They also reserve a general right of control in respect of the number and timing of trains.

(xvii) ... ...

(xviii) ... ...

(xix) All agreements for lines constructed under these terms shall include a special purchase clause permitting the Government of India to purchase the lines at any time, after giving one year's notice...........

In the event of a line being purchased under this clause, the price payable shall be 25 times the average net earnings (excluding payments on account of guarantee or rebate) during the three years preceding the purchase, or 115 per cent of the capital expenditure on the line, whichever may be the greater......

(xx) ... ...

R.C.F. VOLKERS,
Secretary to the Railway Board.

Annexure 12-C

Great Indian Peninsula Railway

Contract of 21 December 1900

Contract for working the Great Indian Peninsula Railway and Indian Midland railway system as one undertaking.

(a) The general conditions of the contract are as as follow :—

(*i*) *Government aid.* Government to pay interest at 3 per cent per annum on the amount for the time being paid up, or credited as paid up, on the shares or stock in the new capital of the Great Indian Peninsula Railway Company which is at present authorised at £ 2,575,000. All capital will be provided by Secretary of State bearing interest at the rate of $3\frac{1}{2}$ per cent per annum or at such other rate as may be agreed upon ; or will be raised by the Company by the issue of debentures or debenture stock at such rate of interest as the Secretary of State may determine. Land was also provided free.

(*ii*) *Terms of Contract.* The line was purchased from the Great Indian Peninsula Guaranteed Railway Company by the State in 1900, and all the contracts then subsisting between the Secretary of State and that Company were determined. The purchase price was £40,781,568 payable up to the 17 August 1948, in the form of terminable annuity of £1,268,516.

(*iii*) *Currency of contract*—The contract is current for a period of 25 years from the 1 July 1900 when it will be determinable by the Secretary of State, paying the amounts paid or credited on all shares and stock and indemnifying the company for all debts and liabilities incurred under sanction.

(*iv*) *Power of Company to surrender contract*—Nil

(*v*) *Terms of working*—If the receipts for any year ending on the 30th day of June (after payment half-yearly to the Secretary of State of the sum of Rs 1,00,00,000 and repayment to the Secretary of State of all interest payable on all the moneys raised after the 30 June 1900 otherwise than by the issue of share or capital stock) exceed the payments for the same period, 19/20th of the surplus are paid to Secretary of State and 1/20th to the Company. Provided that if the Company increases its new capital and issue further shares or stock as fully paid up in exchange for stock of the Company, the Company's share in such surplus shall be increased by an additional fractional share bearing the same proportion to the

original fractional share of 1/20th as the additional capital of the Company bears to the new authorised capital of £2,575,000, but the total fractional share of the Company is not to exceed a one-tenth share.

(*vi*) *Rates and fares*—Certain maxima and minima have been fixed within which the Company is permitted to vary its rates.

INDIAN RAILWAYS IN 1922

Total Railway Mileage.... 37,266

13

Separation of the Railway Finances

Following the report of the Acworth Committee in 1924, it was decided to separate railway finances from the General Finances of the Government of India. The basis of this decision was the Committee's view that Indian Railways could not be modernized, improved and enlarged, "so as to give to India the service of which it is in crying need at the moment", and the Railways could not "yield to the Indian public the financial return which they are entitled to expect from so valuable a property, until the whole financial methods are radically reformed".

According to the Committee, the essence of this reform was the complete separation of the railway budget from the general budget of the country and the emancipation of the railway management from the control of the Finance Department of the Government of India. The Committee observed : "The primary function of any such Department is to reduce to a minimum expenditure in order to keep at the minimum the corresponding taxation. Its officials are not qualified, either by training or experience, to judge the essentially commercial and technical question where and when the circumstances of a railway undertaking justify bold expenditure of large sums, having regard not merely to the actual conditions of the physical machine at the moment, but to the prospects of development and the requirements of the future".

Weakness of the pre-1924 System

The Committee underlined the weakness of the pre-1924 financial management in regard to the adequacy of the maintenance and renewal of railway assets. The Committee condemned the financial system that controlled Indian railways, as will be clear from the following extracts from its report, which succinctly sum up the situation then prevailing :

"That the railway development and, therefore, the economic development of India has been starved, is not the only charge which we are compelled to bring against the system of financial control to which the railways have been subjected. It might have been expected that control purely from the financial point of view would at least have resulted in correct and unimpeachable financial orthodoxy. This has not proved so in practice. We have spoken of the 'Programme' expenditure and the method by which its amount is determined. Now in every commercial concern Capital expenditure and Revenue expenditure are constantly intermixed. And a prudent board of directors, especially when the concern which they are managing is prosperous and paying substantial dividends, takes very good care that Revenue is debited with its full share. The principle is clear that by the time the useful life of an asset or a building has expired, its full original value should have been written off out of Revenue.

"This has not been the case on the Indian Railways. There are scores of bridges with girders unfit to carry train load up to modern requirements; there are many miles of rails, hundreds of engines, and thousands of wagons whose rightful date for renewal is long overpast. Their cost has not been written off. They stand in the books at the original figure. The Government has formed no replacement reserve. It is not now physically possible within a short period of one or two years to replace all the plants of which the economic life is exhausted. If it were possible, it would be a burden upon current revenue too heavy to be borne without upsetting the normal railway finance. The position due to the unwise methods of the past must be redressed gradually. It will never be redressed under the present system of programmes and annual grants and lapses, but only when commercial accounting methods are introduced in the management of a commercial undertaking.

"In our judgement, a financial system which produces these results stands self-condemned. But the faults on which we lay stress outweigh the merits, and in our judgement they are inherent in the existing financial system. Railway management is a highly technical business. It should be placed in the hands of those who understand it. It has little in common with the raising of taxation, on the one hand, or

with the control of the expenditure of ordinary Public Departments, on the other".

The Acworth Committee did not, by any stretch of imagination, intend Indian Railways to be a state within a state, as is sometimes asserted by railway enthusiasts. The Committee observed :

> "At the outset we wish to disclaim any idea that the railway organisation should be independent, an *imperium in imperio.* This is quite out of the question. The Indian Government owns the railways ; the Indian Government must control them. But that is no reason why the control should take the form which is found suitable in respect of other departments of the State. What we propose is in outline that the railways should have a separate budget of their own and assume the responsibilities for earning and expending their own income. The first charge on that income, after paying working expenses, is interest on the debit incurred by the State for railway purposes".

Objectives of the Separation

The underlying objectives of the separation were, first, that Agents of railways should be responsible for the administration, working and financial results of their railways and should be free to manage their undertakings on commercial lines ; and secondly, that Railways should be able to carry out a continuous policy based on the obligation to make a definite return to General Revenues on the money expended by the State on Railways. The essence of this radical reform was that financial control be exercised from within the railway organisation instead of from without and that the railway management be completely emancipated from the Finance Department of the Government of India.

The Separation Convention

The Separation Convention was adopted by a resolution of the Central Legislative Assembly on 20 September 1924. Ever since then, this "Convention", modified from time to time, has been the basis for determining the relationship between the railway finances and the General Exchequer. It would, therefore, be useful, even at the risk of some repetition, to reproduce the main features of the "Convention".

1. The railway finances were to be separated from the general finances of the country and the general revenue was to receive a definite annual contribution from railways which was to be a first charge on the net receipts of the railways;

2. The railway contribution was based on the capital-at-charge and the working results of commercial lines (excluding capital contributed by Indian States and district boards, etc.) at the end of the penultimate financial year plus one-fifth of any surplus profits remaining after payment of this fixed return, subject to the condition that, if in any year railway revenues were insufficient to provide one per cent on the capital-at-charge, surplus profits in the next or subsequent years were not deemed to have accrued for purposes of division until such deficiency had been made good ;
3. The interest on the capital-at-charge and the loss on working of strategic lines were to be borne by General Revenues and were consequently deducted from the contribution so calculated in order to arrive at the net amount payable from Railway to General Revenues each year ;
4. Any surplus, remaining after this payment to General Revenues, was to be transferred to a railway reserve, provided that, if the amount available for transfer to the Railway Reserve exceeded in any year Rs. 30 crores, only 2/3rd of the excess over Rs. 30 crores was to be transferred to Railway Reserve and the remaining one-third accrued to General Revenues;
5. The Railway Reserve Fund could be used to secure the payment of the annual contribution to General Revenues, to provide, if necessary, for arrears of depreciation and for writing down and writing off capital and to strengthen the financial position of railways in order that the services rendered to the public could be improved and rates reduced ;
6. The Railway Board was authorised, subject to such conditions as were prescribed by the Government of India, to borrow temporarily from capital or from the reserve for the purpose of meeting expenditure for which there was no provision or insufficient provision in the revenue budget, subject to the obligation to make repayment of such borrowings out of the revenue budgets of subsequent years;
7. A Standing Finance Committee for Railways, consisting of one nominated official member of the Legislative Assembly who was the chairman and eleven members elected by the Legislative Assembly from their body, was to examine the estimates of railway expenditure, which the Railway Board had to place before it, on some date prior to the date for the discussion of the demands for grants for railways in the Legislative Assembly ;

8. The expenditure chargeable till 31 March 1923 to Programme Revenue was shown from 1 April 1924 under a Depreciation Fund created to meet the cost of replacements and renewals;
9. The Railway Budget was to be presented to the Legislative Assembly in advance of the General Budget, separate days being alloted for its discussion, the Minister for Railways and Transport making a general statement of railway accounts and working. The expenditure proposed in the Railway Budget, including expenditure from the Depreciation Fund and the Railway Reserve, was to be placed before the Legislative Assembly in the form of Demands for Grants ;
10. The form of the Railway Budget, the details it gave and the number of demands into which the total vote was divided were to be considered by the Railway Board in consultation with the Standing Finance Committee for Railways.

Separation of Audit and Accounts

The Finances of Indian Railways were separated from the General Finances of Central Government commencing with the accounts of 1924-25. About the same time, an experiment was made with the separation of Railway Accounts from Audit. The system was first introduced on the East Indian Railway from 1 December 1925 and, as the results proved satisfactory, it was extended by degrees to the other state-managed railways.

Under the separation arrangements, a representative of the Finance Department was appointed as a member of the Railway Board and designated Financial Commissioner. In this capacity, he took over the responsibility for the compilation of the Accounts of Indian Railways from the Auditor General, as from 1 April 1929.

The separation of Accounts from Audit involved, firstly, an internal check--the primary duty being to assist the Executive—and secondly, an external test-check, called Statutory Audit. The departmental head on each Railway in respect of the former function was designated Chief Accounts Officer ; that in respect of the latter, Chief Auditor.

The separation was designed to achieve quicker preparation of accounts and returns, as required by the Executive and the Administration for the control of expenditure against estimates and grants ; prevention of irregular expenditure ; speedy clearance of expenditure held under objection on technical considerations ; introduction in the Administrative, Executive and Accounts Offices of revised systems of accounting and detailed methods of procedure, more in accordance with commercial

practice and directed to sccure greater efficiency ; greater attention, especially by the Accounts Department, to the internal economy of the Railways so as to cover all proposals for reducing working costs in wages and materials, for reduction of stores balances and for prevention of losses; and the creation of an Audit organisation, absolutely independent of the Administration.

The 1924 Convention had laid down the fixation of an annual contribution from the railways to the General Exchequer based on the capital-at-charge of the railways and the profits earned by them. It stipulated that the return would be calculated on the earnings of the commercial lines and the interest on the capital-at-charge and the loss in the working of the strategic lines would be deducted from the contribution. The Convention also provided for the establishment of the Railway Reserve and the Depreciation Reserve Funds.

The actual working of the Convention showed that as the Railways' contribution depended upon the extent of profits or losses they made, the General Exchequer could not depend upon them for an assured contribution necessary to enable it to frame civil estimates or for jacking up its own financial position in years of depression when the need for assistance was the greatest. The Convention had also not enabled the railways to build adequate reserves for themselves.

A review of the Separation Convention after three years had been provided for in the document. The review was not undertaken due to political changes that were in the offing, and later owing to World War II. Meanwhile, due to the economic depression, which set in from 1929, the Railways were not able to make any cnntribution to the General Exchequer as the net revenue they earned during 1930 to 1936 was less than the interest due on the capital-at-charge. Money had, therefore, to be withdrawn from the Depreciation Reserve Fund to meet interest charges. The wartime surplus in the forties, however, enabled the Railways to clear their outstanding liabilities to the General Exchequer and reimburse the loans taken from the Depreciation Reserve Fund. These ups and downs led to reconsideration by the Central Legislative Assembly of the financial arrangements embodied in the 1924 Convention.

The basis of contribution to the General Exchequer, as laid down in the 1924 Convention, was abandoned and it was provided that, from the financial year 1943-44, the surplus on commercial lines, after repaying any losses outstanding to the Depreciation Reserve Fund, was to be shared between the Railways and the General Exchequer in the ratio of one to three, the loss on strategic lines being, as usual, debitable to the General Revenues.


INDIA
SHOWING RAILWAYS
1939
REFERENCES
EXISTING RAILWAY LINES :
BG
MG
NG
AFGHANISTAN
BALUCHISTAN
IRAN
NEPAL
BHUTAN
CHINA
BURMA
ARABIAN SEA
BAY OF BENGAL
CEYLON
ANDAMAN ISLANDS
NICOBAR ISLANDS
LACCADIVE ISLANDS
QUETTA
KARACHI
N.W.R.
J.R.
DELHI
E.I.R.
G.I.P.R.
B.N.R.
M.S.M.R.
S.I.R.
N.S.R.
E.B.R.
A.B.R.
BOMBAY (Central)
POONA
KALYAN
MANMAD
JALGAON
BHUSAWAL
NAGPUR
RAIPUR
BILASPUR
JUBBULPORE
ITARSI
BHOPAL
BINA
RATLAM
UJJAIN
JHANSI
ALLAHABAD
MANIKPUR
KATNI
GAYA
BALHARSHAH
KAZIPET
SECUNDERABAD
GUNTAKAL
HUBLI
GADAG
MIRAJ
KOLHAPUR
LONDA
BEZWADA
WALTAIR
VIZAGAPATAM TOWN
NAUPADA
PURI
MADRAS
CHINGLEPUT
CUDDALORE
ERODE
TRICHINOPOLY
MADURA
QUILON
NEGAPATAM
MANGALORE
MYSORE
TRINCOMALEE
BATTICALOA
COLOMBO FORT
BADULLA
MANDALAY
RANGOON
PROME
BASSEIN
MOULMEIN
PEGU
CALCUTTA
GULF OF MANAAR
Mouths of the Irrawaddy
Coromandel Coast
Malabar Coast

14

After Independence

On 15 August 1947, British rule ended on the Indian subcontinent and two separate states, India and Pakistan, took birth. This was the result of a partition which overnight divided what was one network into two separate railway systems and dismembered the North Western and the Bengal Assam Railways.

The Partition

The North Western Railway in the West and the Bengal Assam Railway in the East had to be split in accordance with a new international boundary, determined on political imperatives, which could not possibly take railway convenience into consideration. Of the NWR's 6881 miles (11,078 km), only 1855 came to India, forming the Eastern Punjab Railway, which was hardly a viable unit. The Bengal Assam Railway, consisted of 3555 miles (5724 km) on the eve of Partition, of which 1942 was in Indian territory after Independence. This mileage was distributed among the EIR, the Oudh-Tirhut Railway and a new Assam Railway. The Sealdah Division of the BAR was transferred to the East Indian Railway. The Jodhpur Railway lost 319 miles (514 km) which fell within Pakistan.

In addition to the problems of reconstituting the Indian parts of these systems into self-sufficient units, and complicated staff changes, were the formidable difficulties caused by the mass movement of persons displaced from each Dominion. Violence which had broken out in March 1947 in Northern India, came to a head after Independence, and the railways

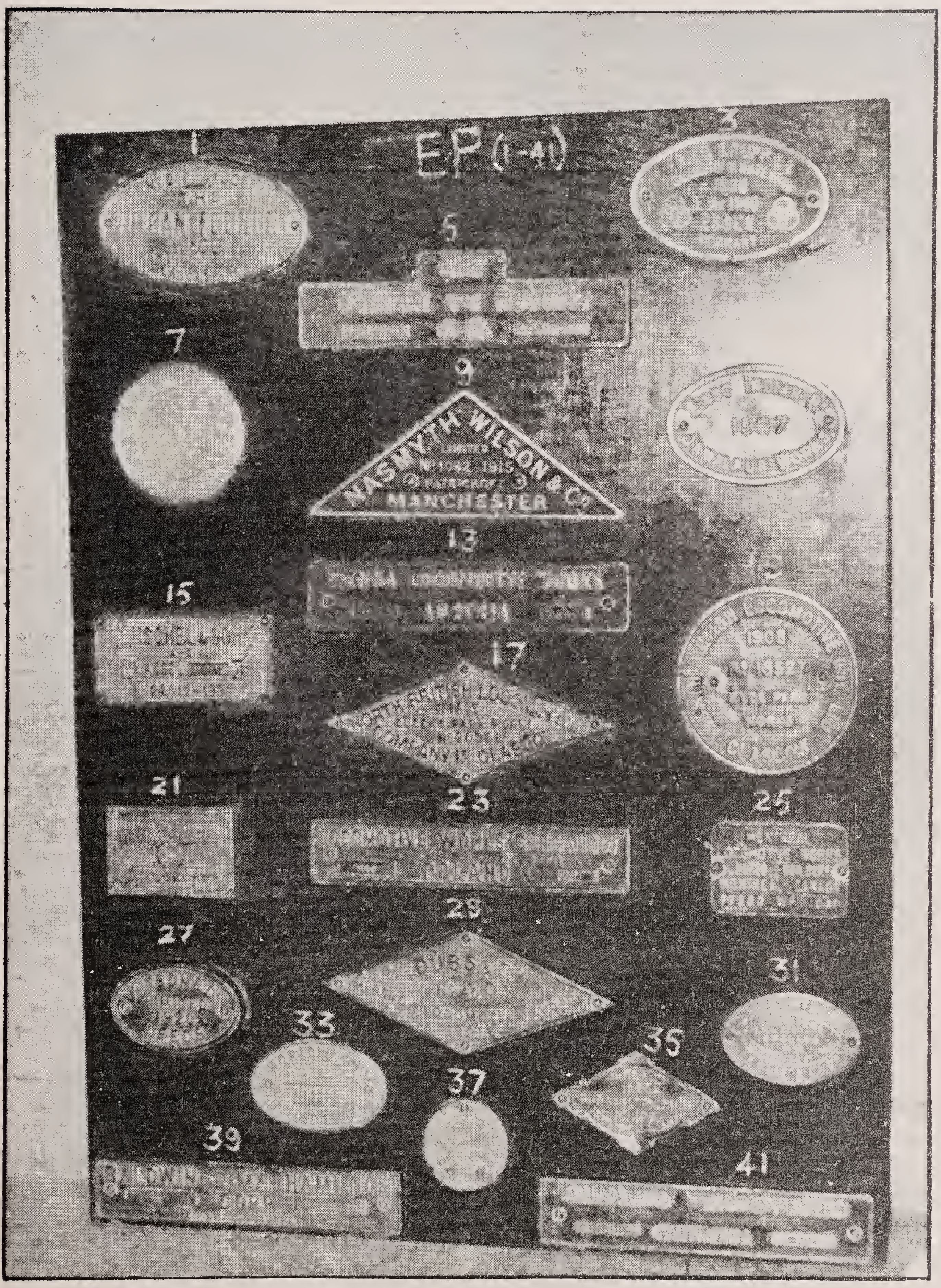
suffered serious damage. The worst area was the Punjab, through which passed the boundary between India and West Pakistan and thus divided the traditional homeland of the small Sikh community. There were disturbances around Lahore before 15 August, but services were not disrupted till a week after when trains across the new frontier were temporarily halted and elsewhere services had to be curtailed. By late September, the skeleton services operated in the Punjab had to be abandoned, so as to allow the railways to deal with the massive exchange of populations between the two countries, Hindus and Sikhs from Pakistan and Muslims from India. Floods in September added to the railways' problems.

On 3 August the situation at Lahore station was in a state of confusion. On 9 August all hell broke loose and the station and its surroundings were the scene of much carnage. Railway staff instead of reporting for duty stayed at home to protect their families. There seemed to be no authority in command and it was surprising how a few trains moved in and out. One such train brought 400 men of the NWR to Delhi and they joined the temporary headquarters of the Eastern Punjab Railway at Khyber Pass.

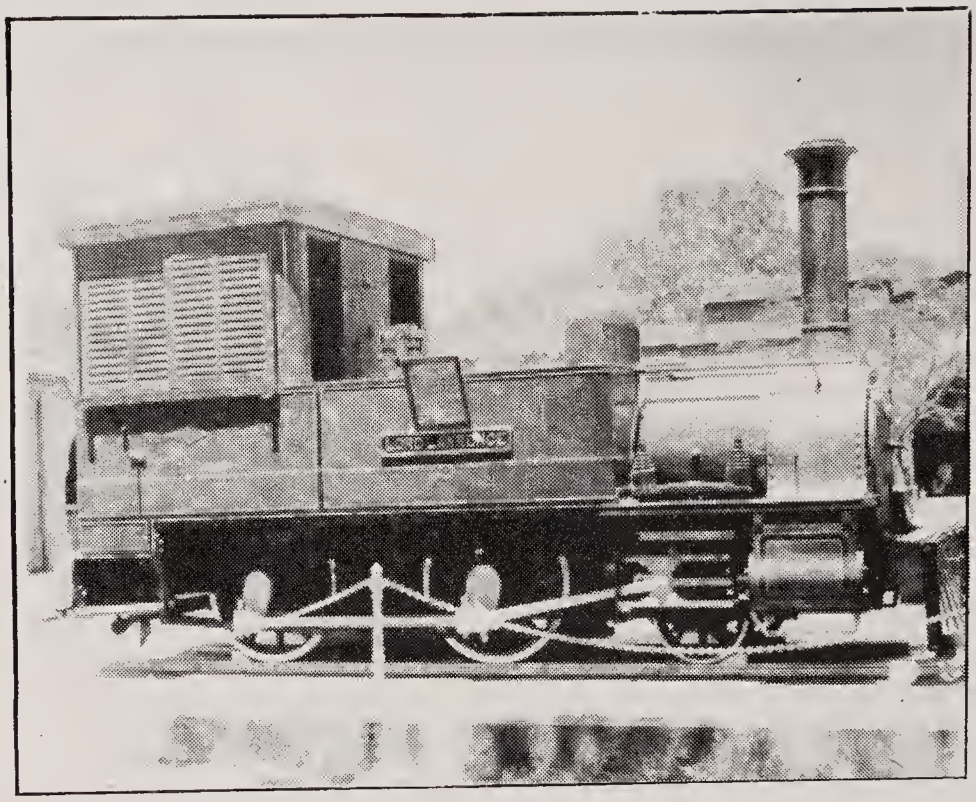
For some weeks after the Partition the train service was confined to a couple of freight trains and the Frontier Mail. No other train crossed the Indo-Pakistani border between Amritsar and Lahore. Thus, what had once been the NWR's busiest main line was in shambles. Several stations on the main line between Lahore and Ludhiana had to be closed down as the staff ran for safety. The Frontier Mail which ran between Bombay Central on the BB & CI and Peshawar on the NWR was first diverted via Bhatinda and later via Firozpur and Ludhiana.

On some days the Frontier Mail too had been held up en route by armed men who looted the baggage and murdered some passengers. Other less important trains were similarly mauled. Soon even these trains ceased running. Passenger trains which formerly had run to Lahore and beyond terminated at Delhi, although after October 1947 most of the services were practically normal.

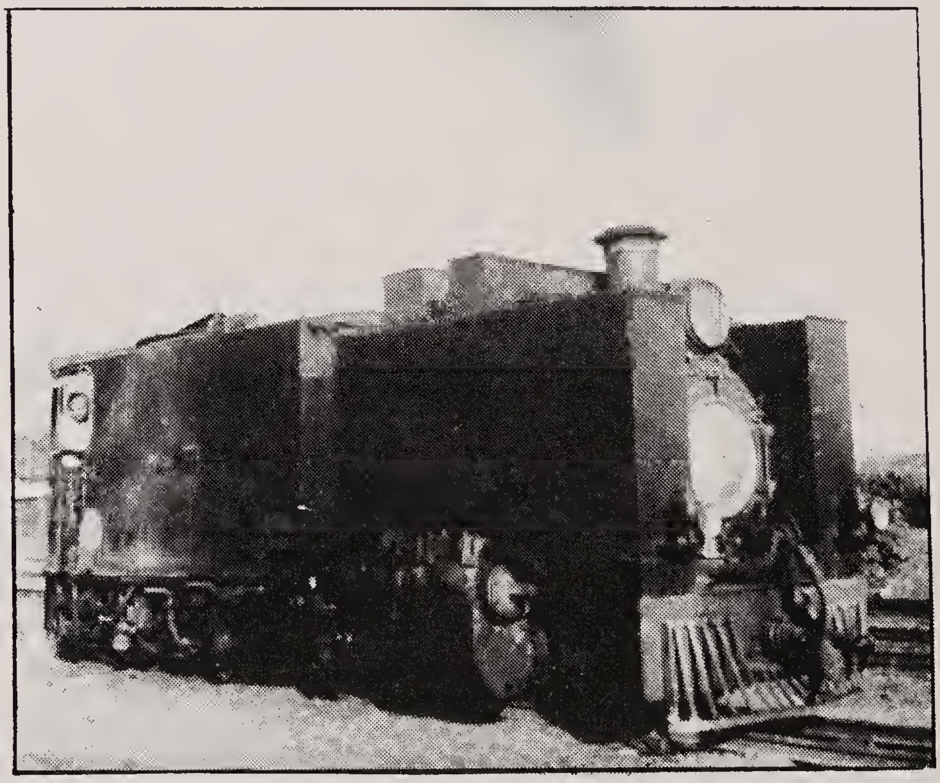
Nature added its fury to the railways' trouble on the Eastern Punjab Railway. Extensive breaches were caused on the main line from Ghaziabad, through Delhi, to Amritsar, by heavy rains and floods. A number of bridges were damaged and had to be rebuilt, for instance bridge No 20, between Chiheru and Jullundur Cantonment, on Amritsar-Ludhiana double line section suffered so badly that a new bridge had to be built on the down line while on the up line the old one had to be rebuilt.



Crest plates of locomotive manufacturers, mostly foreign, who supplied locomotives to Indian Railways. Old locomotive crests are a collectors' item and replicas are available at the Rail Transport Museum, New Delhi—Photo Rail Transport Museum.



"Lord Lawrence"— A class metre gauge locomotive built by Messrs Dubs & Co, U.K. imported in India in 1872.



zf-107 A compact and powerful engine used on Kulu Valley section of Eastern Punjab Railway for passenger train service—present Northern Railway.

Makers Henschel & Sohn, Kassel, Germany

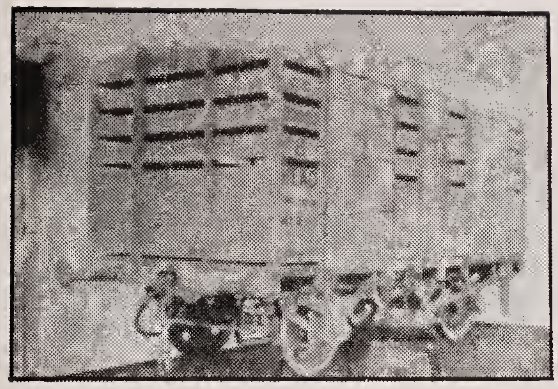
Year 1934

Railway Northern Western Railway and later Eastern Punjab Railway

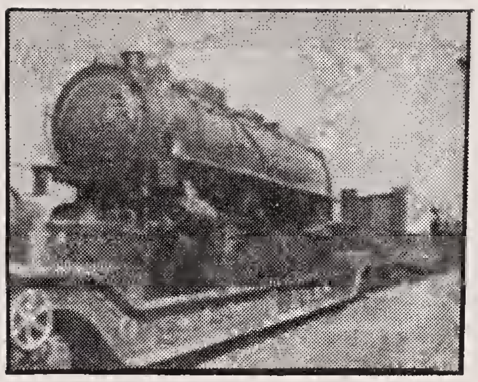
Gauge 2'—6"

Wheel arrangement 2-6-2 T (side tanks)

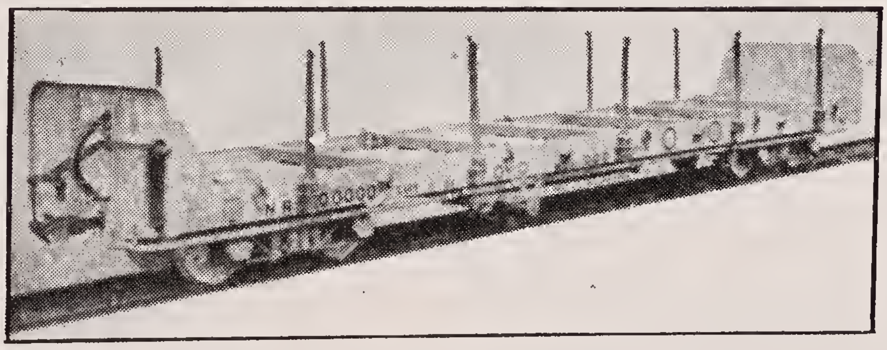
Numbers Makers number 22589, Railway number ZF-107



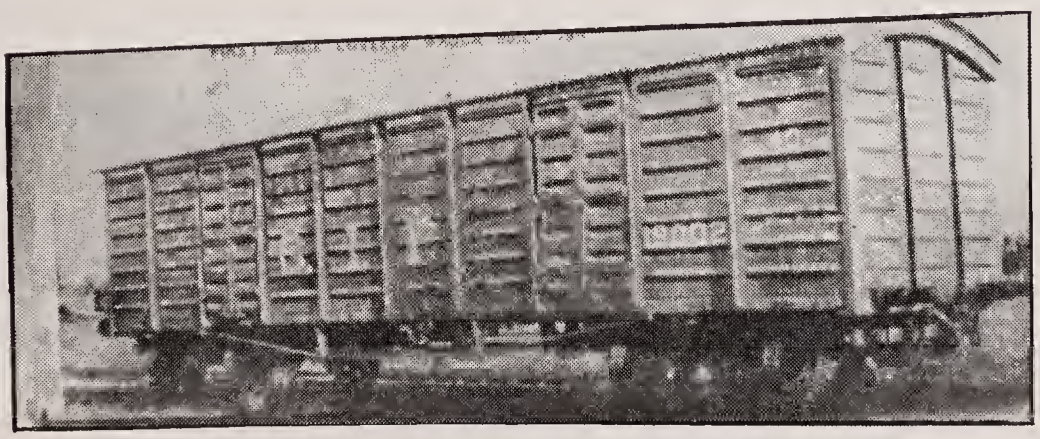
a. A cattle wagon for transport of live stock



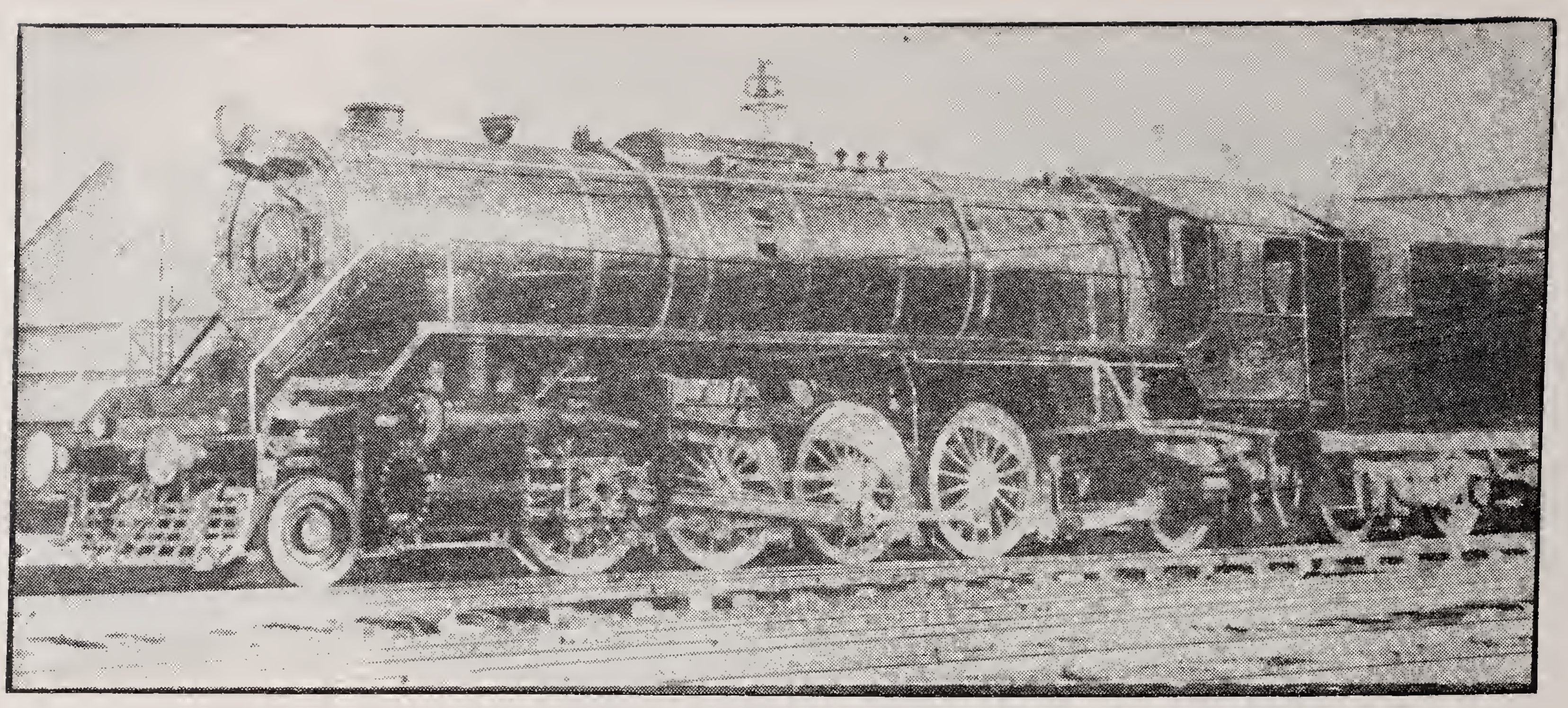
b. Metre gauge locomotive being transported in a broadgauge well wagon.



c. Bogie Rail Wagon is used on Narrow 2'-6" Gauge.

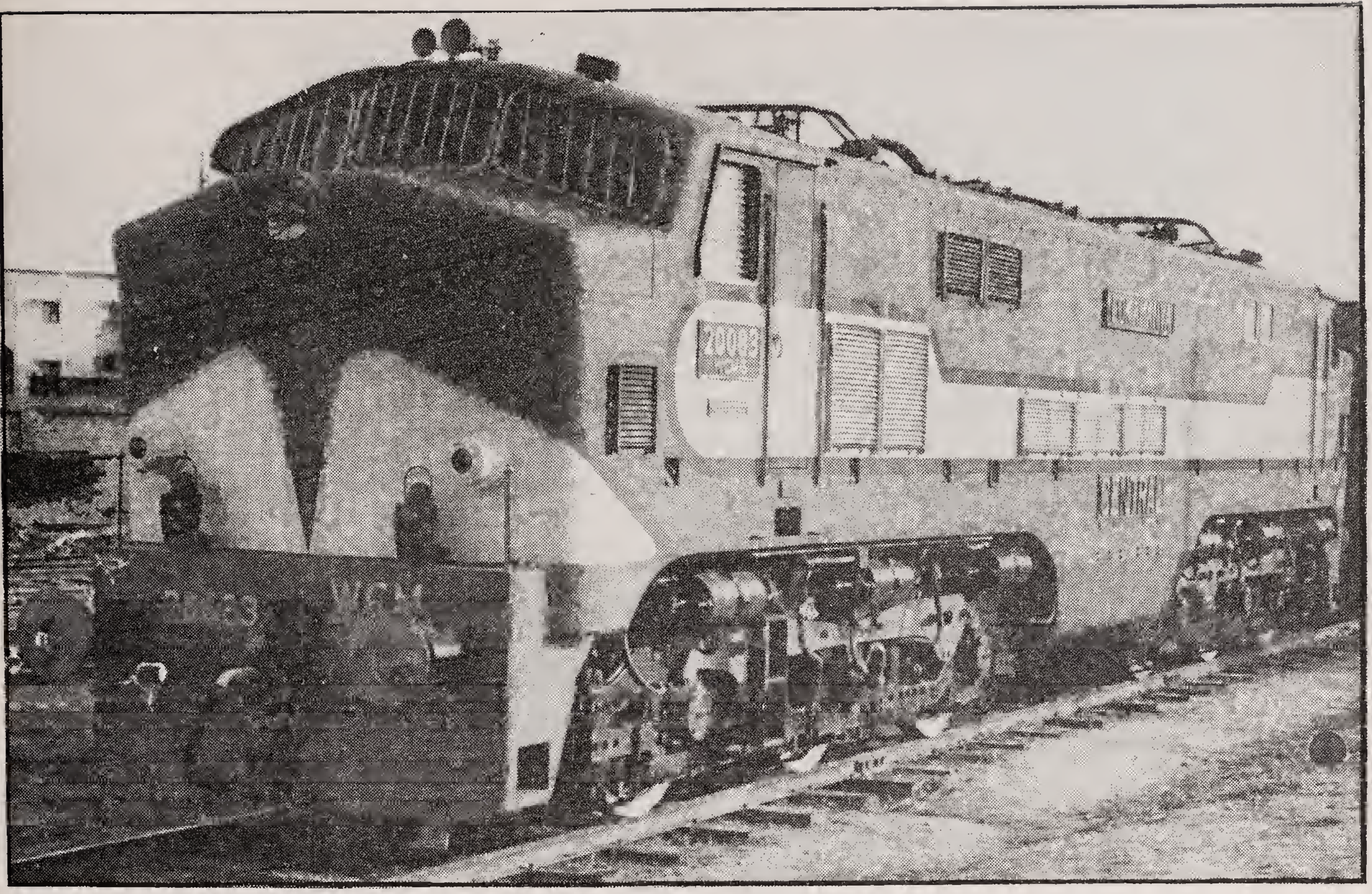


d. A Bogie Covered Wagon built in 1911

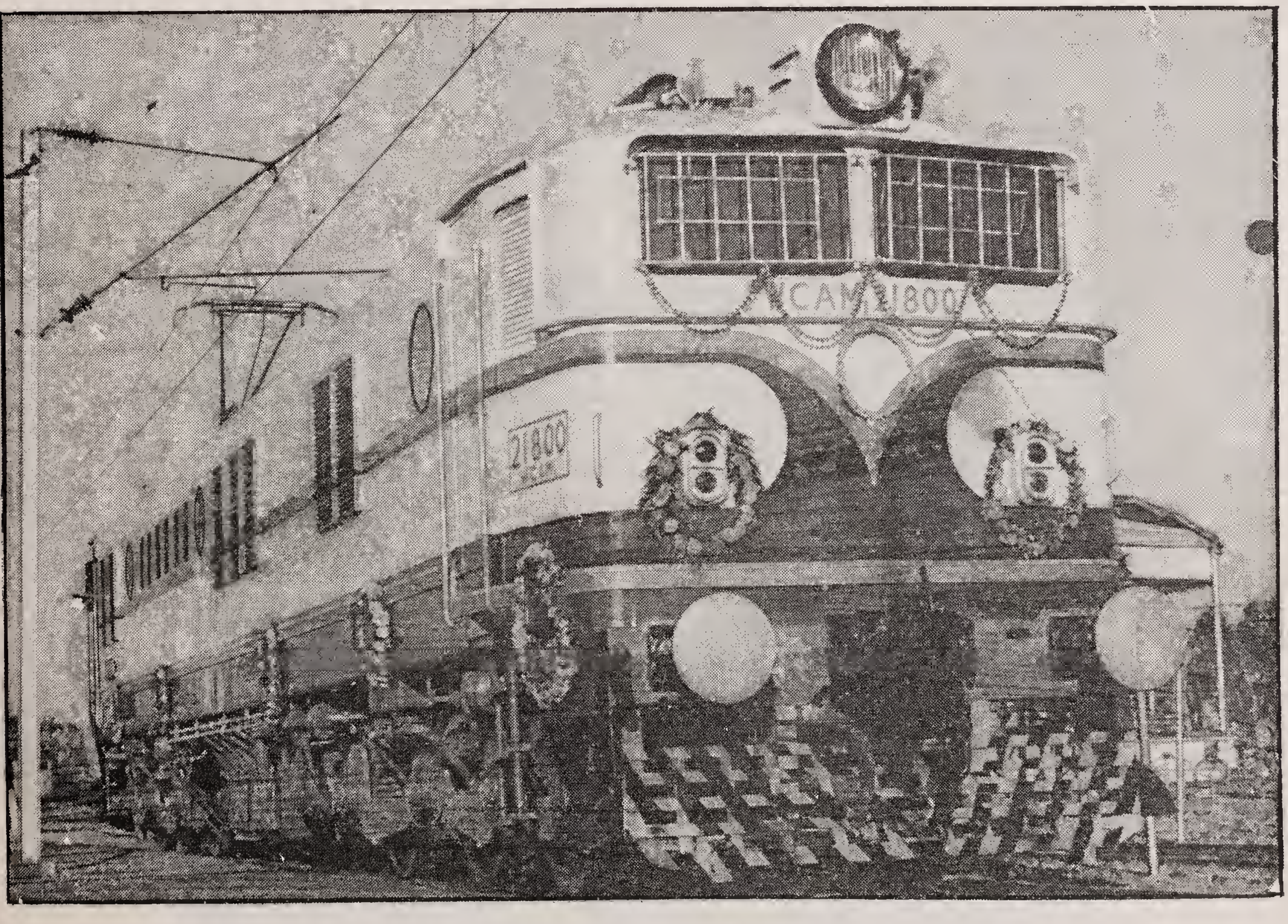


Chittaranjan — WG locomotive from Chittaranjan

Imported WAG Electric Locomotive

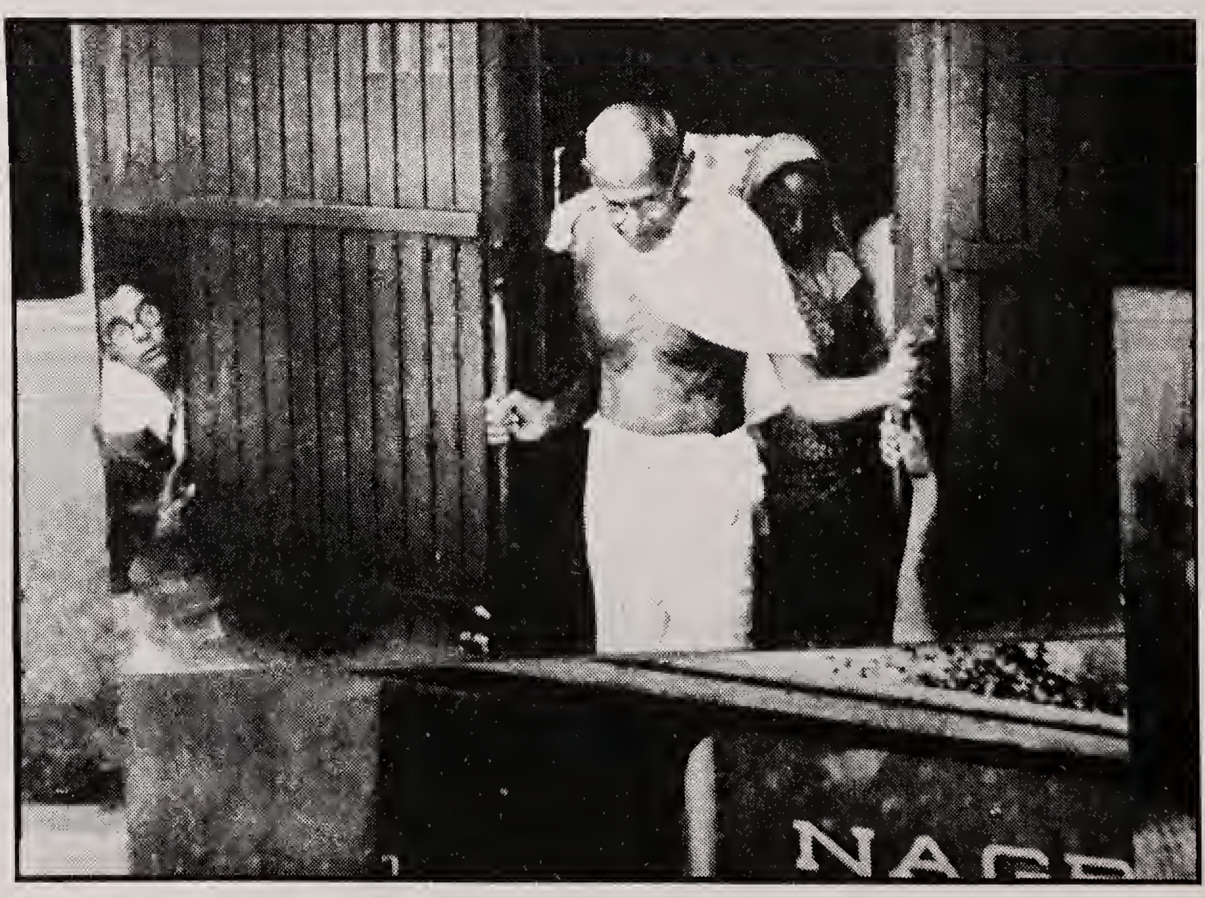


"LOKMANYA", built by Chittaranjan Locomotive Works.



"Ballabh" — First ac/dc electric locomotive, a WACM 1 built by Chittaranjan Locomotive Works

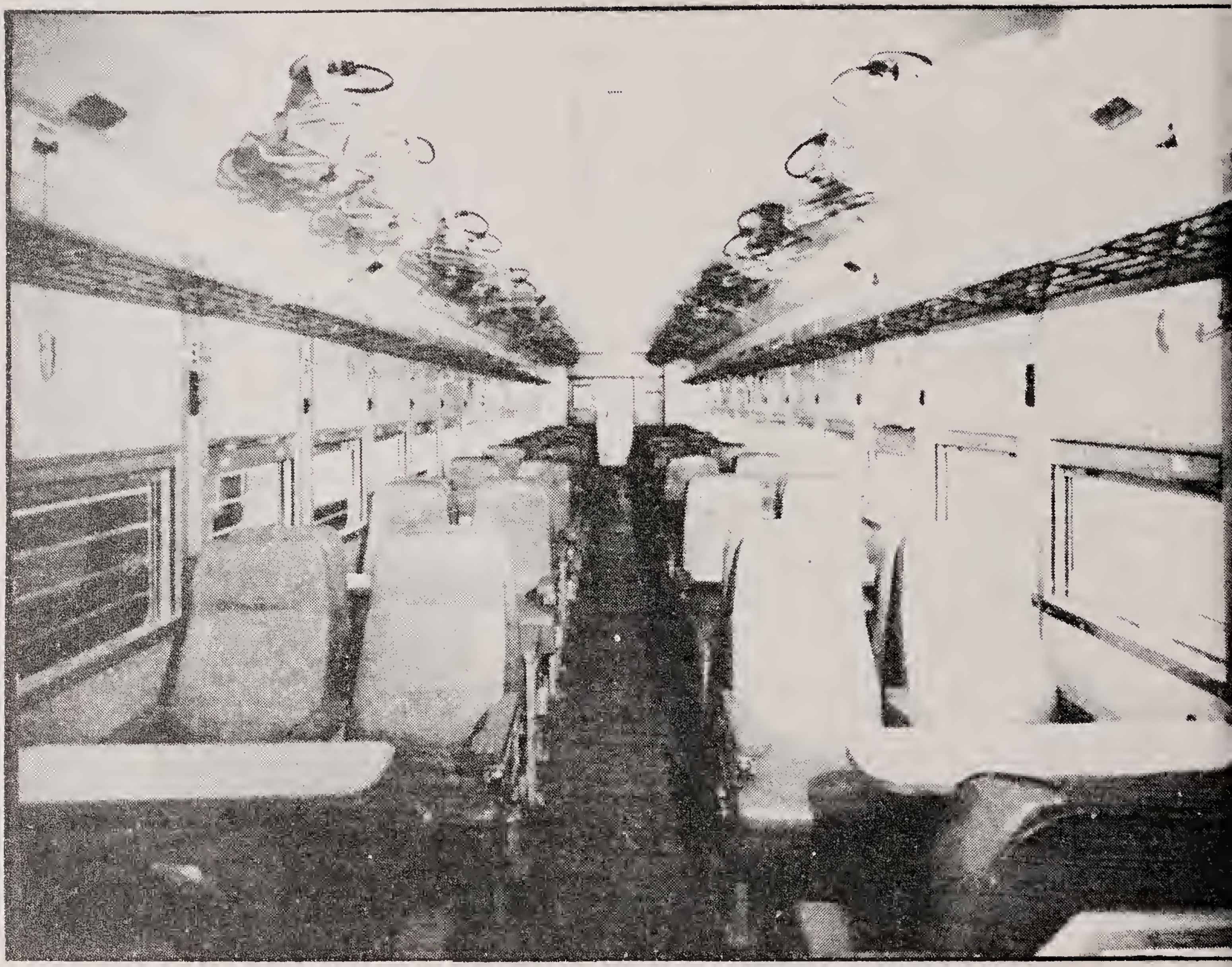
Gandhiji by train. The Mahatma was an inveterate traveller and preferred the railway to any other mode.



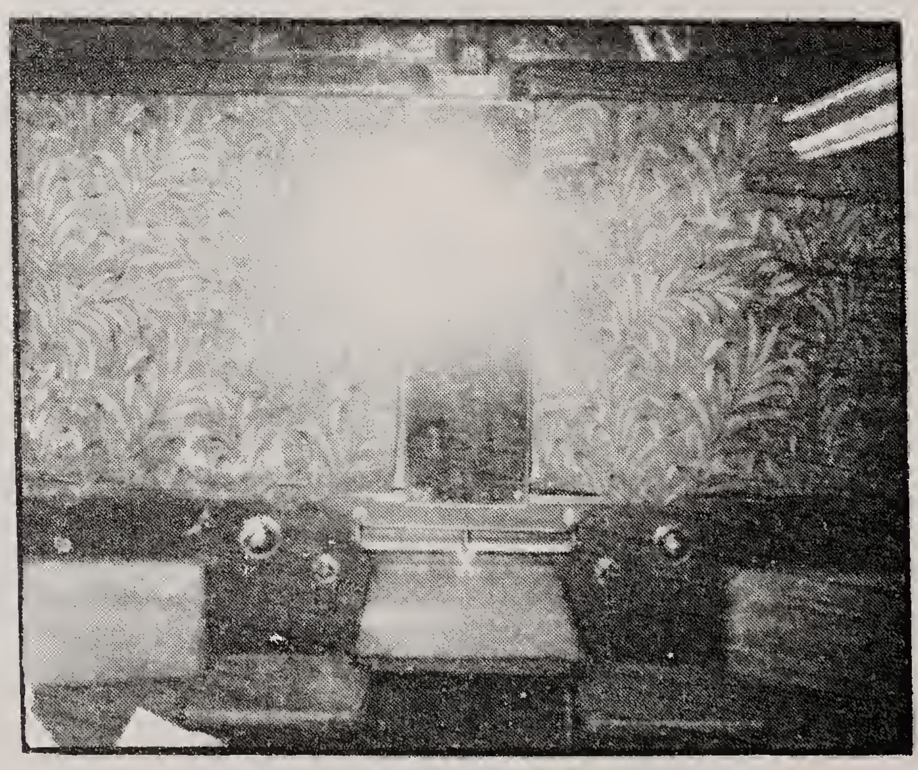
~~Mahatma Gandhi~~, an inveterate traveller preferred the railway to any other mode.

Arrangements to control passenger traffic in the Kumbh Mela at Allahabad in January 1977.

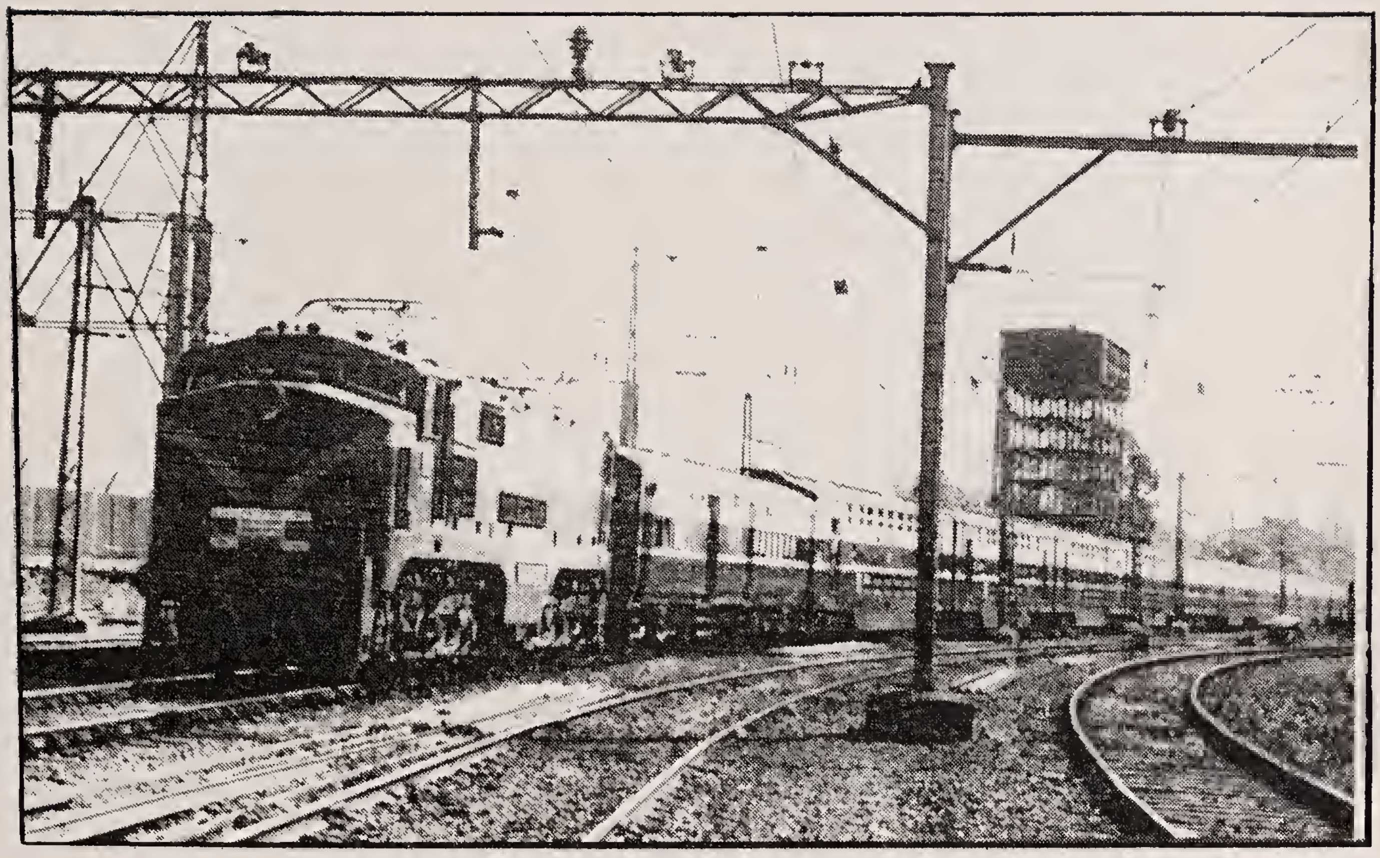
The interior of a 3 tier second class sleeper.



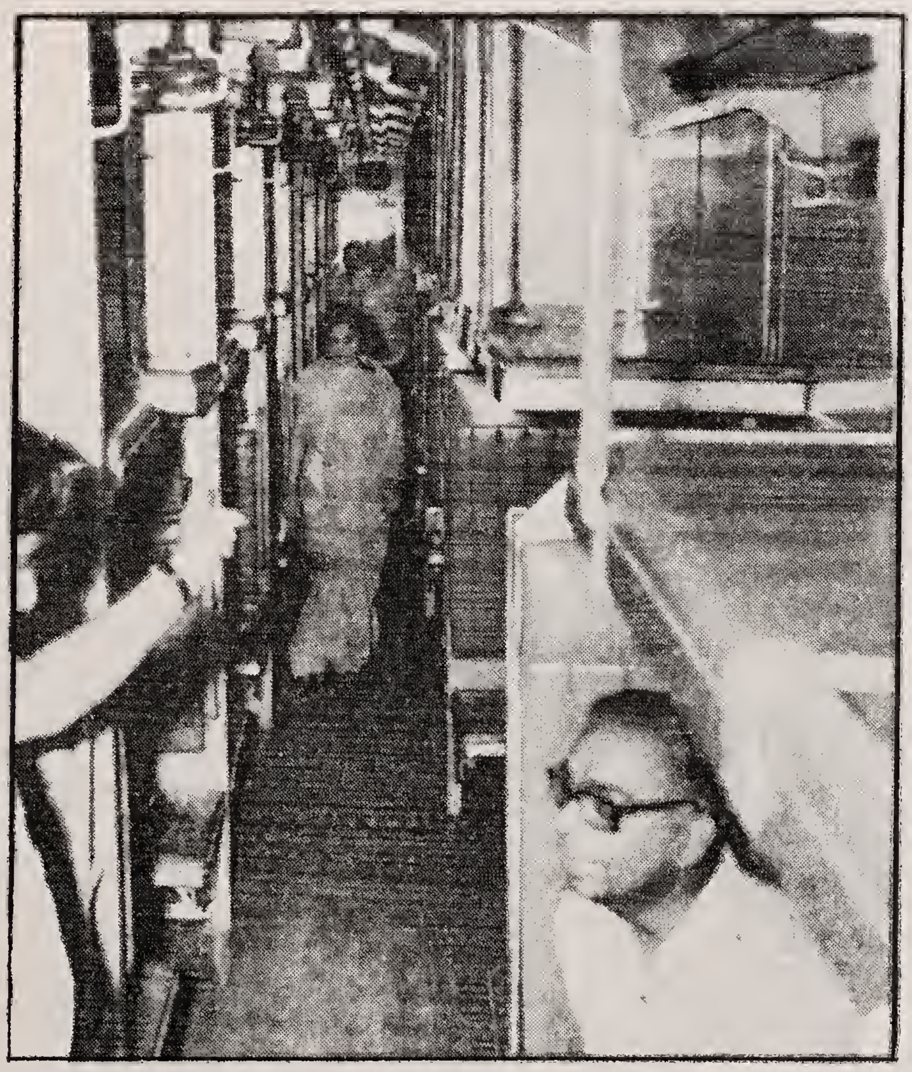
An interior view of a chair-car turned out by the Integral Coach Factory, Perambur.



The luxuriant interior of an air-conditioned compartment.



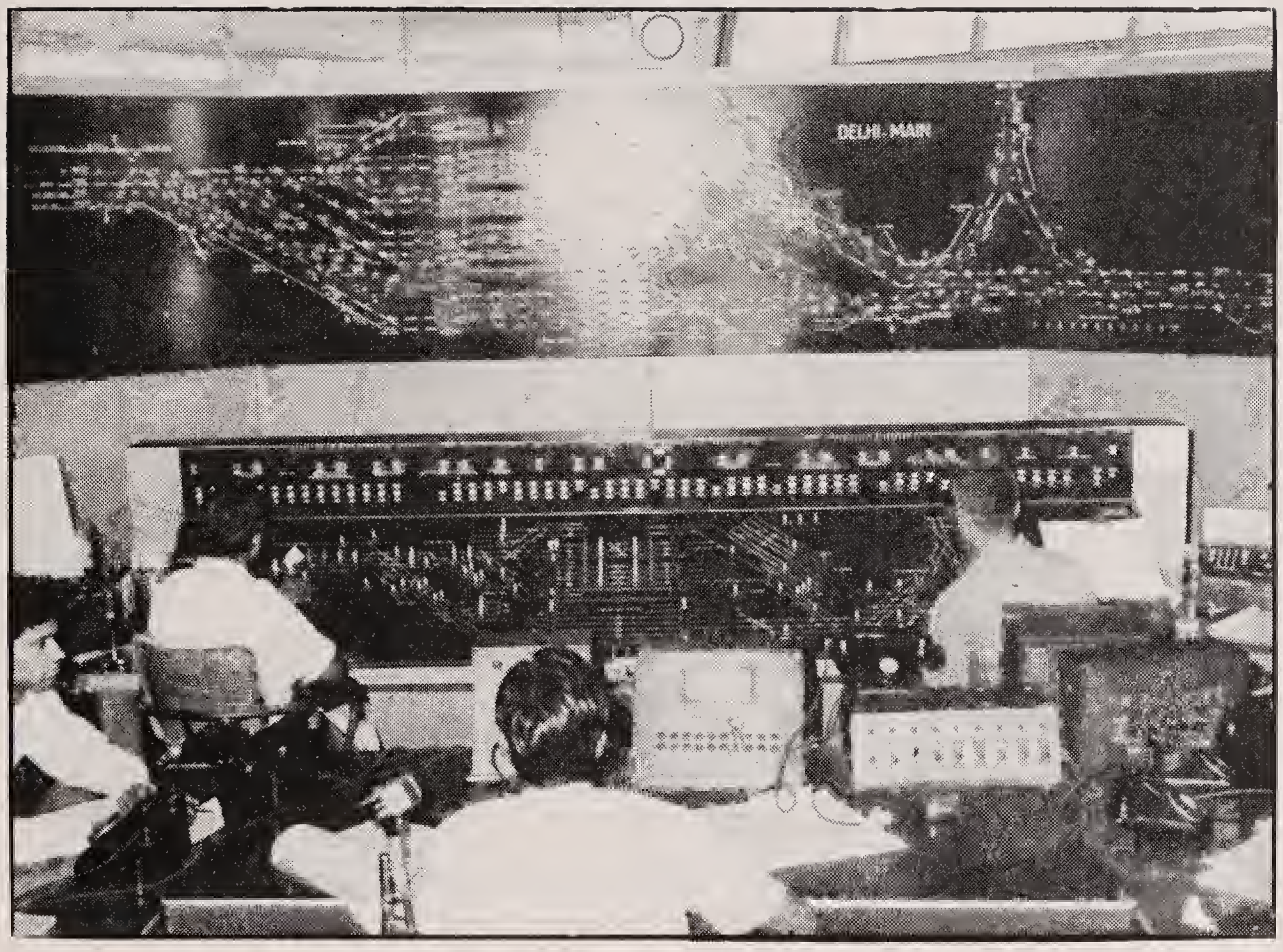
A modern double-decker train, Singhagad Express.



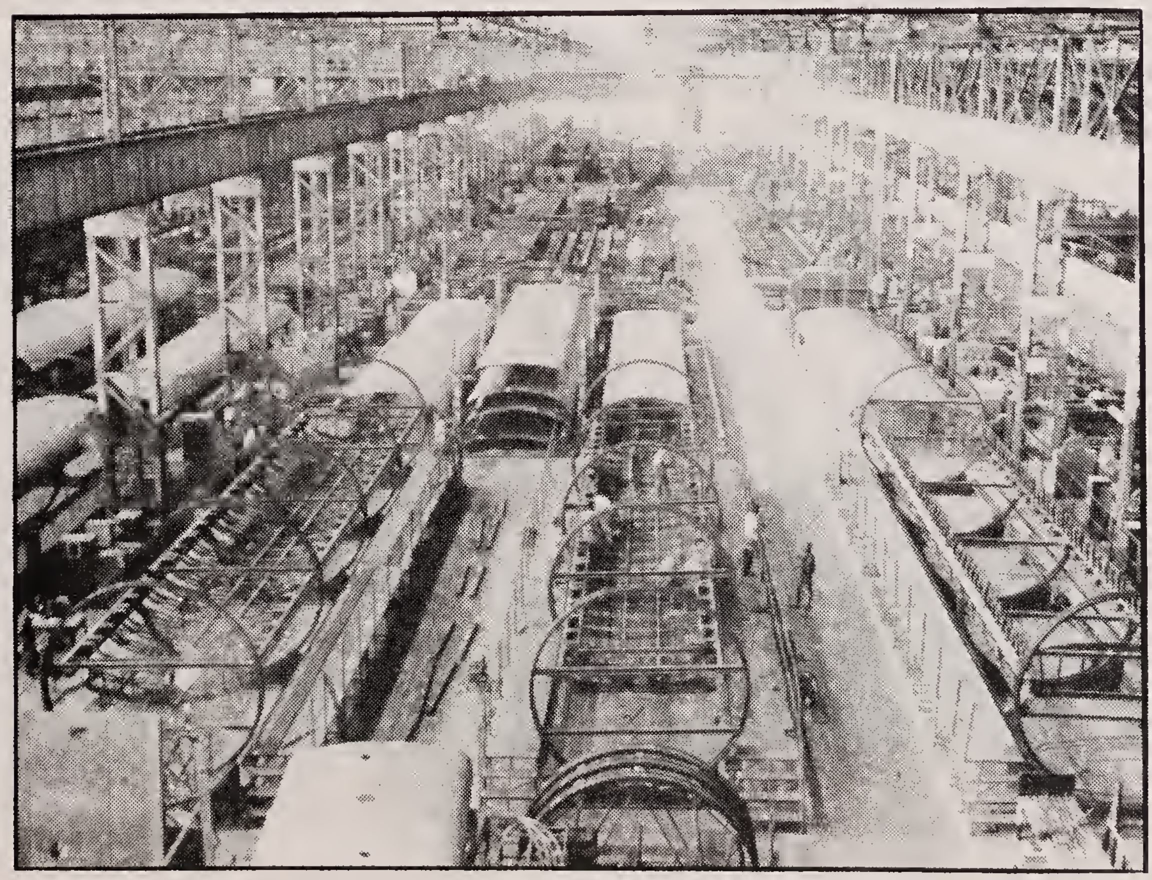
Inside view of an air-conditioned second class sleeper.

A drinking water fountain at Delhi Main Station.

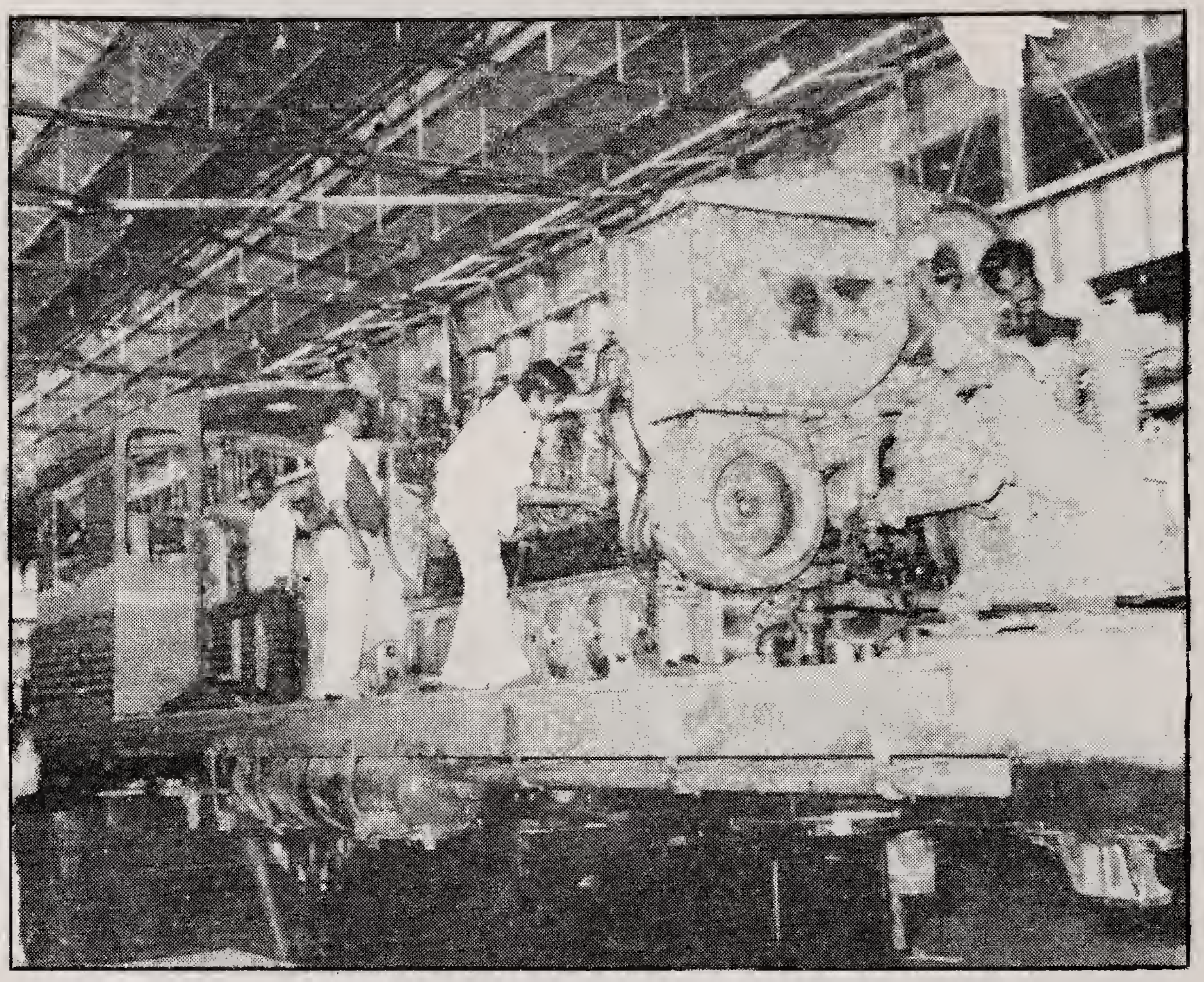
A bookstall in the 2nd class waiting hall of Delhi main Station.



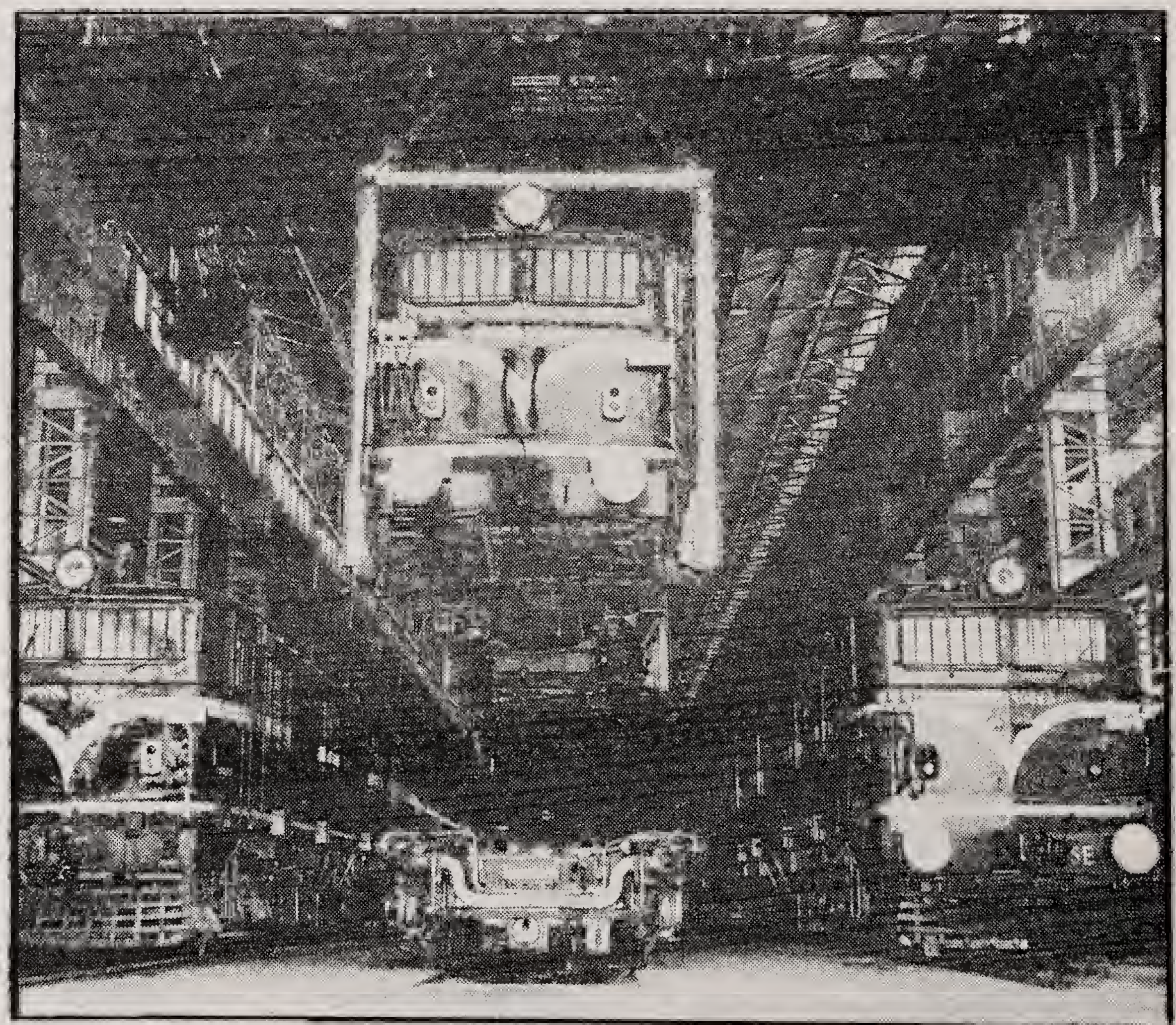
Main Cabin at Delhi Main Station.



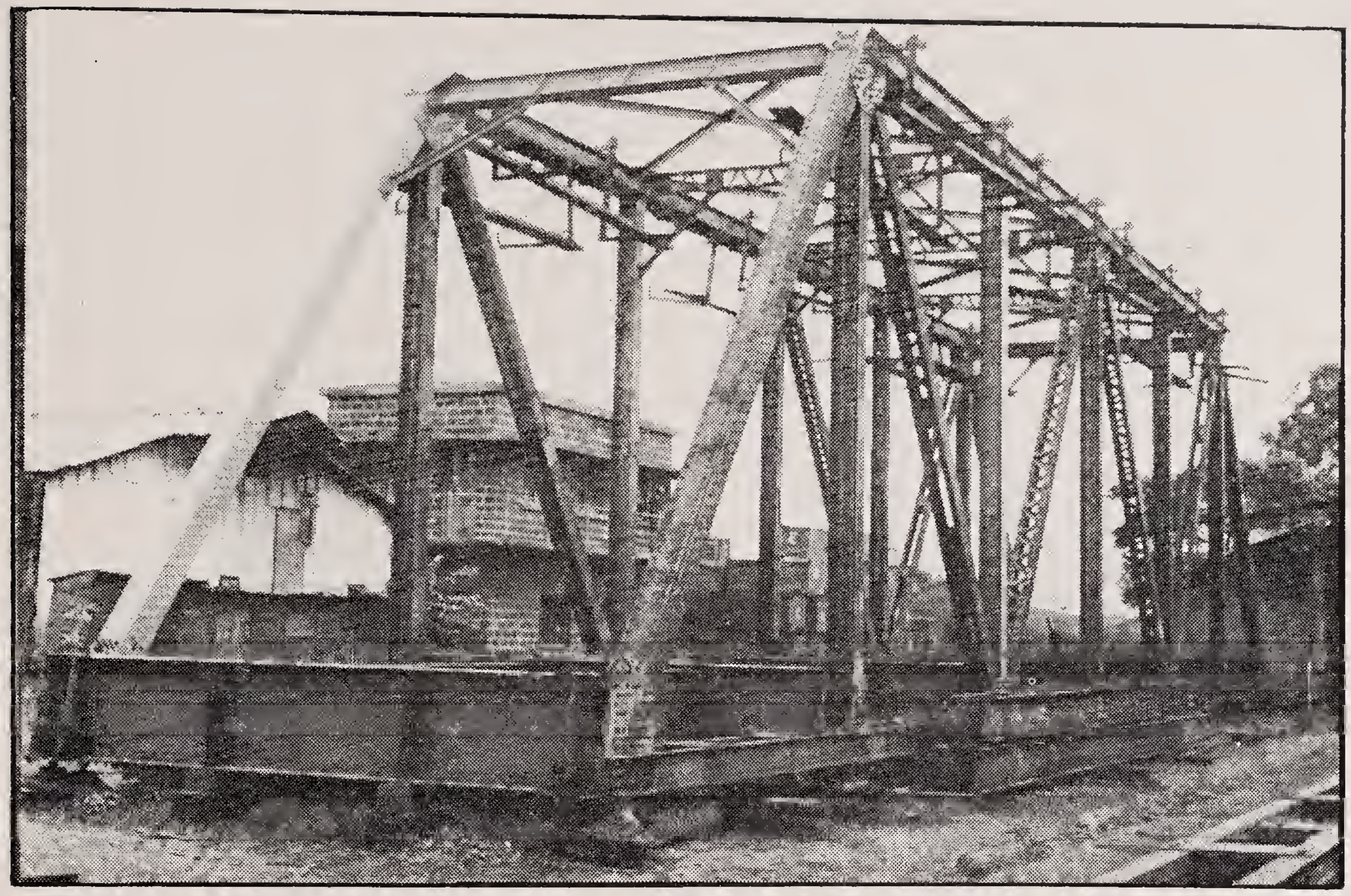
Integral Coach Factory, Perambur, Main Assembly Shop—General view



Diesel Locomotive Works, Varanasi — a locomotive is being assembled

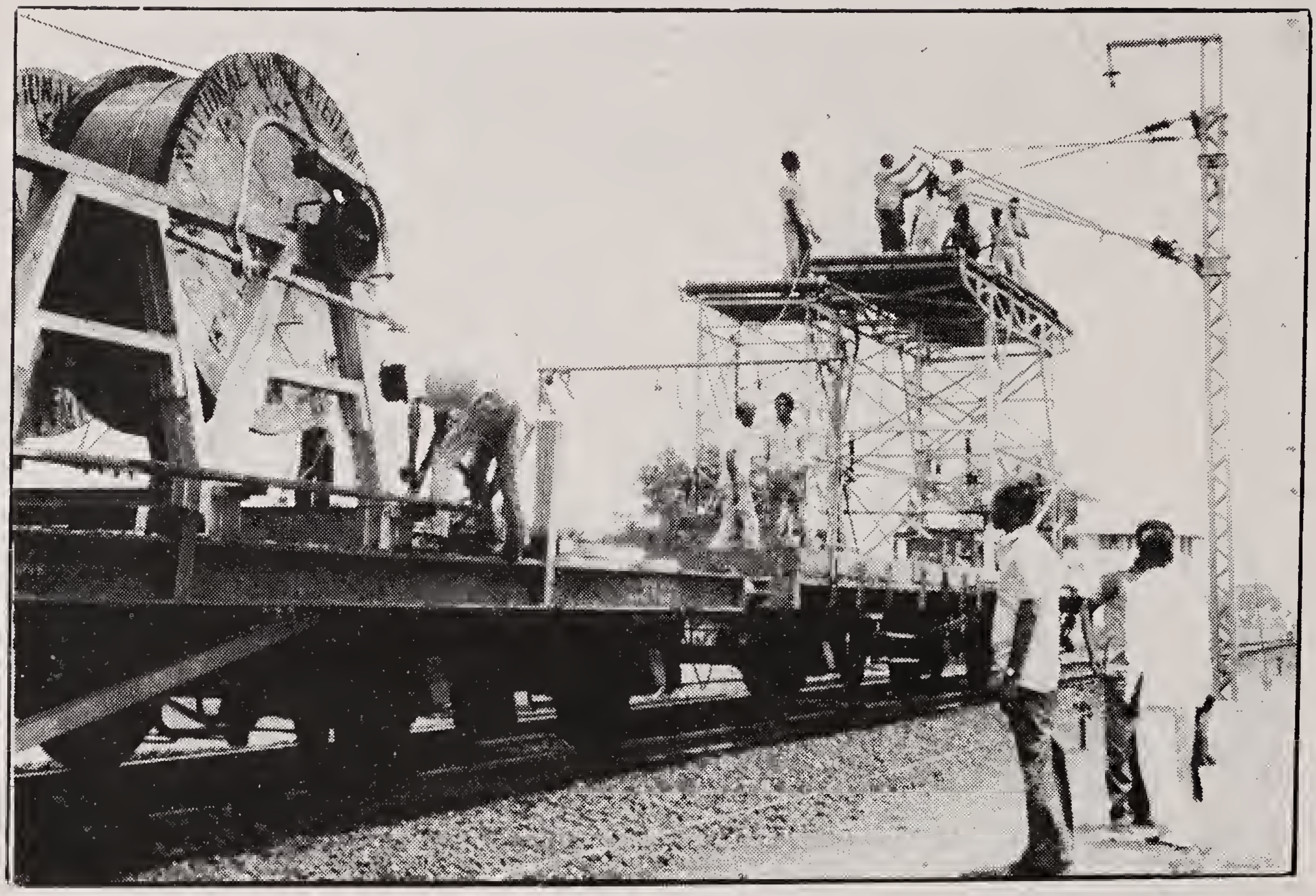


Chittaranjan Locomotive Works—wheeling of an electric loco.



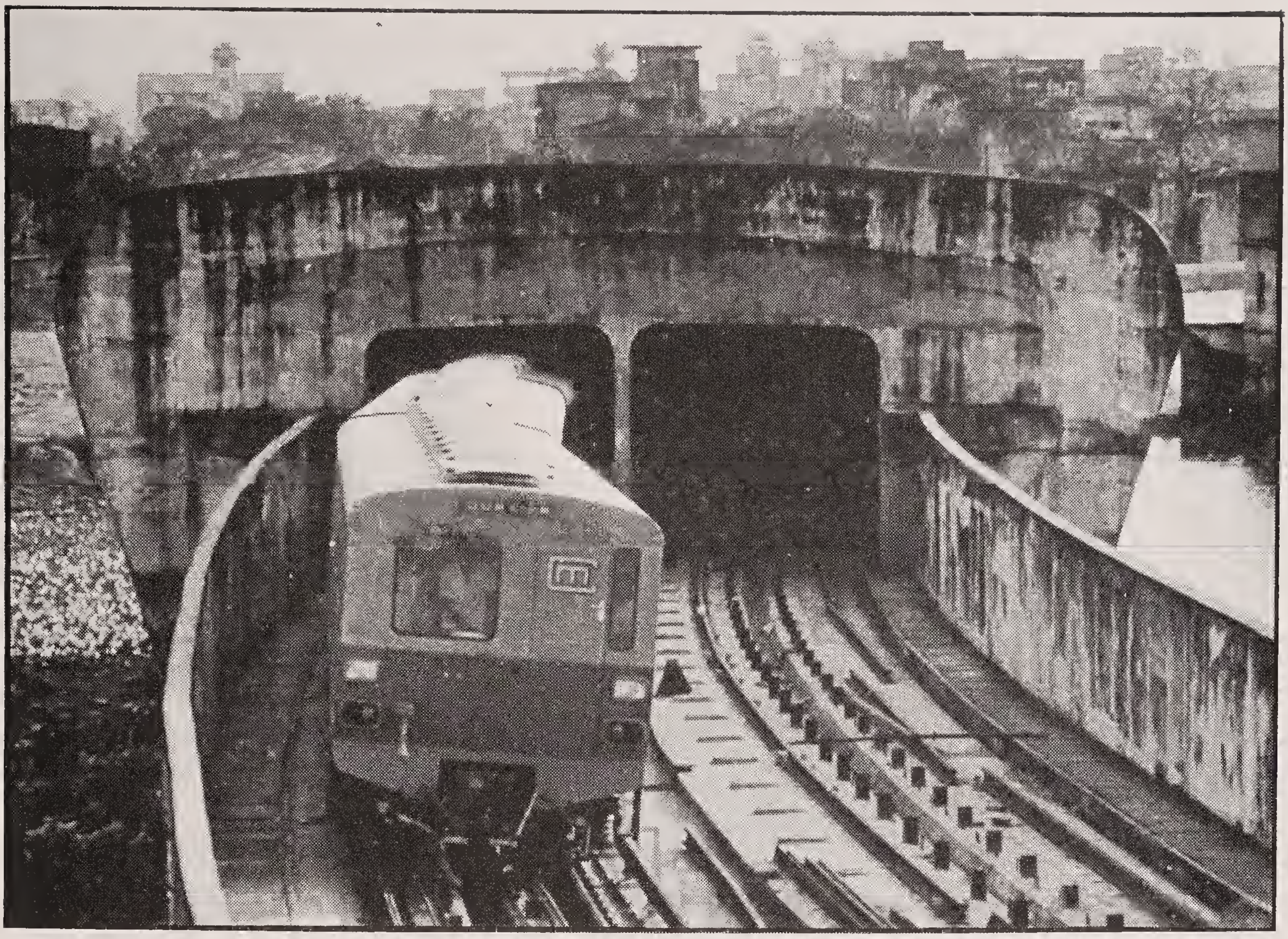
A broad gauge standard span manufactured and erected at Central Engineering Workshop, Manmad in 1979, designed by RDSO.

A special long bogie wagon designed by RDSO for a consignment of unusual dimensions.



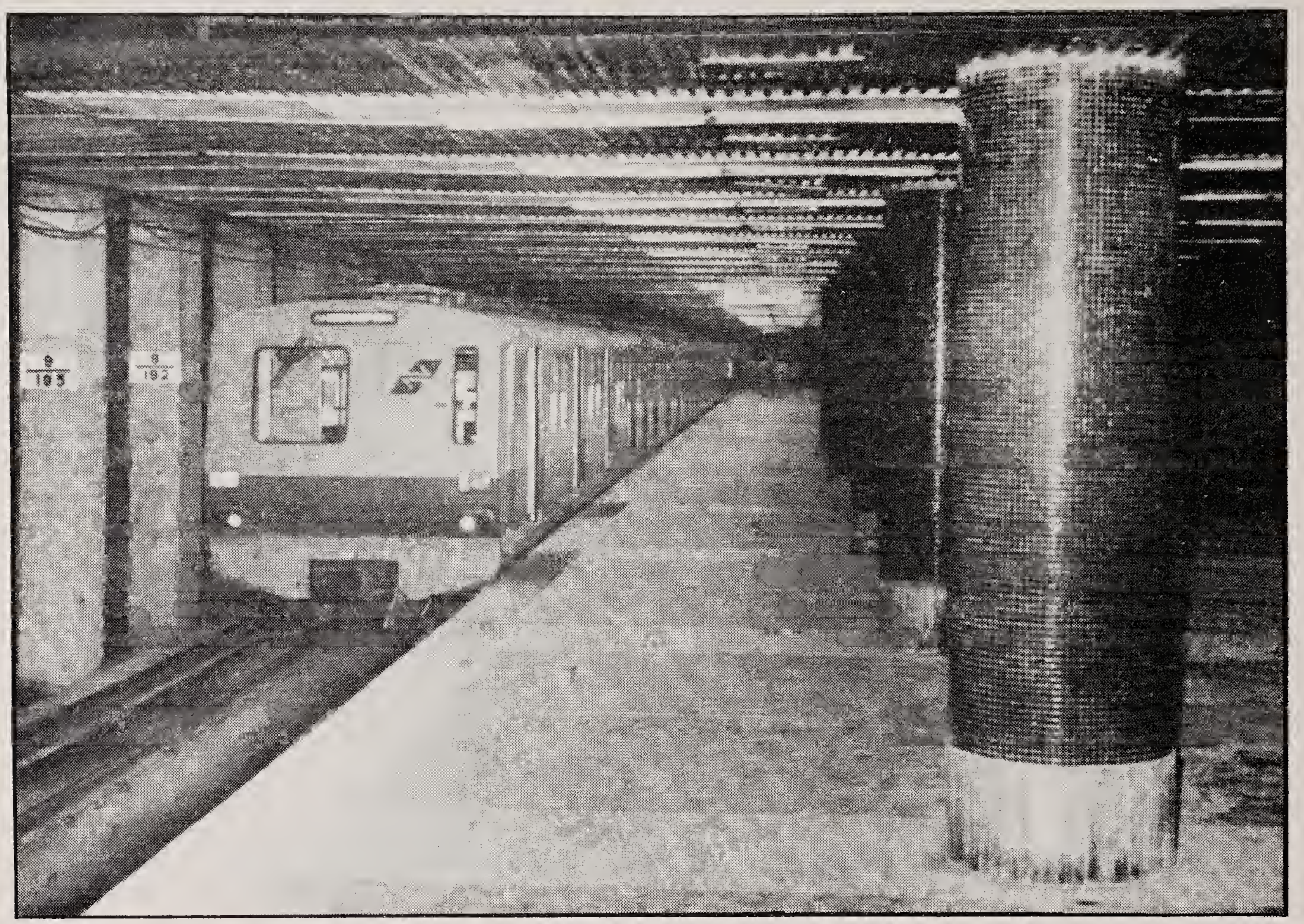
Wiring for Vijayawada-Gudur Railway Electrification near Ongole.

Construction of Park Street underground station in progress. Vehicles can be seen passing over the decking in the background.

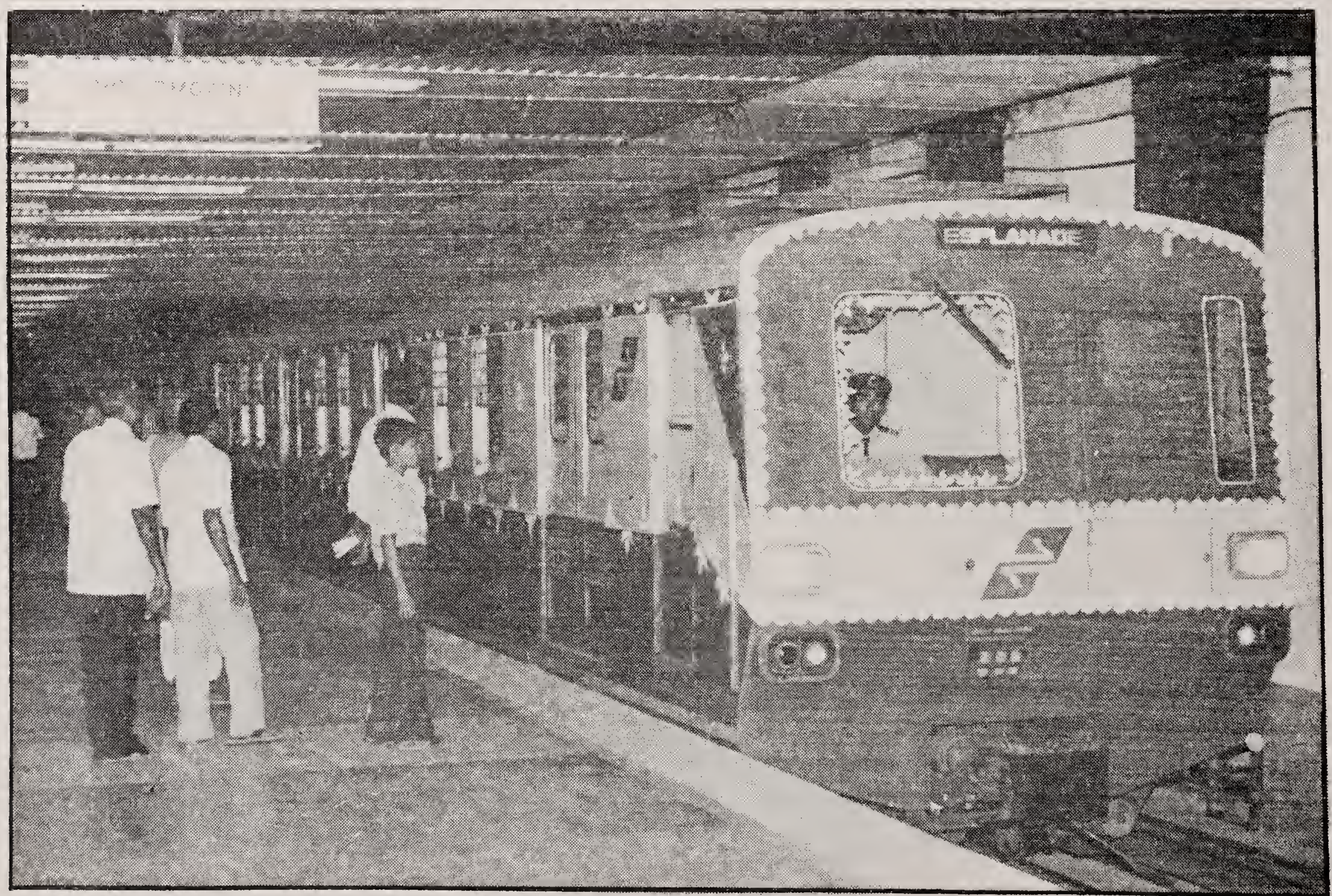


Prototype coaches of Metro Railway Calcutta on trial.

An EMU Train on the Rupnarayan Bridge near Kolaghat on the Howrah-Kharagpur Section of the South Eastern Railway.



A detailed view of the Park Street Station



A train at the Park Street Underground Station.

In the eastern sector, things were relatively quiet due to the presence in Calcutta of Mahatma Gandhi who was there on his way to Noakhali on a peace mission. There were, however, sporadic cases of violence, for instance mob rioting inside Ballygunge station on Bengal Assam Railway on 8 August. As cases of violence continued, Gandhiji undertook a fast pledging to break it only when peace was restored. He did so on 4 September after fasting for seventy-three hours. He left for Delhi on 7 September and decided to stay on there until peace prevailed.

The Great Killing

During the first month after Partition, the railways handled about 700,000 evacuees, despite their own difficulties caused by the shortage of coal and appropriate categories of tradesmen. As millions of refugees took to the road, the stations became crowded with people awaiting special refugee trains. In Bombay, both termini were crowded by thousands of Muslims awaiting trains to Pakistan. In Calcutta, Howrah and Sealdah stations became the temporary abode of thousands who had fled from East Pakistan. The stations jam-packed with countless humanity, became highly insanitary. Similarly, in Delhi area, thousands of Hindu refugees sat at the stations with mountains of baggage, waiting to be cleared to refugee camps elsewhere. These crowds were a convenient target for religious fanatics. On 9 September, a gang of stabbers was found committing murder at Delhi station and four persons out of the gang were shot dead by the police under the orders of the Deputy Commissioner. The vulnerability of railway trains and stations to organised attacks had become so serious, that evacuation by train had to be temporarily given up in favour of air services and foot convoys escorted by army personnel.

Alarm chains were pulled at pre-arranged spots and trains ambushed so that passengers could be murdered to wreak vengeance. It became the practice for each refugee train, typically carrying about 5000 passengers, nearly one-third of whom sat on the roofs of carriages, to be provided with an escort of soldiers armed with Bren guns, travelling at the rear of the train in a sandbagged flat wagon. This protection was not enough but perhaps nothing better could be done when millions were on the move. Troops tended to identify themselves with their co-religionists, and at times, turned a blind eye to the killings. At Ludhiana on 28 August, the evacuees on 35 Up train attacked those travelling in the reverse direction by 36 Down. Curiously, such incidents led to a decision between the governments of India and Pakistan to send an equal number of special trains in either direction.

Train services remained completely disorganised till 9 September 1947. The Punjab Mail and Calcutta Mail ran out of Delhi, but the Grand Trunk Express from Madras could not come in and was held up at Mathura. The Frontier Mail had not been running for some days. The metre gauge services on BB & CI were also not operating from Delhi. As traffic officers manned the control office near Paharganj round the clock, tracer bullets shrieked past the roof of the divisional office. At one time, all lines out of Delhi had to be closed for a week. No 101 Railway Construction Company of Queen Victoria's Own Sappers and Miners from Bangalore helped the Eastern Punjab Railway in the evacuation of refugees from Western Punjab. Towards the end of 1947, however, the situation improved. Altogether, about four million refugees were moved by rail during 1947-48.

Evacuee Railwaymen

Among the refugees were many railwaymen. This loss of staff caused serious difficulties during subsequent years, because Muslims, many of whom fled to Pakistan, traditionally belonged to the locomotive and workshop trades, while non-Muslims, many of whom fled to India from Pakistan, filled jobs in traffic and clerical categories. Some who were engaged in technical jobs lost their lives, for instance, twenty-five of them were killed in the mechanical workshop at Moghulpura on 13 August. The overall shortage of engine crew in India was about 18 per cent of the pre-partition strength, while on certain railways, like the East Indian, the shortage was over 45 per cent. The situation in the workshops was no less serious.

It was an irony of fate that Hindu refugee railwaymen stranded in the province of Sindh were unable to travel by train to India, due to the breakdown of train services between the two dominions. Their departure to India was also delayed by a few weeks because of the advice given by Mahatma Gandhi that Hindus should stay on in Sindh, but they soon found to their distress that their position had been made untenable by communal passions. Even if special trains could be laid on for them, the risk of undertaking a long journey from Karachi to Amritsar via Lahore through a thousand miles of Pakistan territory was so great that such a course could not be seriously considered. Special flights had, therefore, to be arranged between Karachi and Delhi to rescue the railway staff of the NWR who had opted to serve in India. At Delhi, they were accommodated in special refugee camps as an interim measure, before their distribution to other railways in India.

There was a considerable drop in the Inter-Dominion movement of refugees by rail during 1948-49 as compared with the phenomenal figure of the previous year. About 158,000 non-muslim refugees were moved by rail from West Pakistan to India and about 27,000 in the reverse direction. Within India, there was considerable movement by rail from the refugee camps to dispersal camps and to areas where refugees were rehabilitated.

The Post-Partition Problems

The partition of the country created many problems and difficulties. The two major systems—the Bengal Assam Railway on the eastern border, and the North Western Railway in the north-west—had to be divided between the two new dominions. Exchanges of railway staff between one dominion and the other seriously dislocated normal work. Some of the major workshops, bridge and track depots and stores were suddenly lost to the two systems, without any alternate provision having been made. The remaining portion of the NWR in West Pakistan, which was designated the Pakistan Western Railway, was deprived of Indian coal and was obliged to convert its locomotives to oil burning.

It had been agreed that Moghalpura Workshop in Pakistan would overhaul the rolling stock of the Eastern Punjab Railway, but this did not materialise, which necessitated the distribution of repairs to other Indian Railways' workshops. As these were already overloaded, the arrangement did not prove satisfactory and the rolling stock of the border railway, particularly passenger coaches, were reduced to a pitiable condition. The original hope that metre gauge workshops, situated in East Pakistan, would continue to serve the Assam Railway, and that the EIR would handle broad gauge repairs for East Pakistan also did not materialise.

As regards traffic arrangements, the Sealdah Division, which was transferred to the East Indian Railway, continued to be treated as a separate unit, so far as rating and routing of traffic was concerned. Traffic between this division and the Eastern Bengal Railway (Pakistan) continued to be routed via the frontier junctions, namely Bongaon-Benapor and Banpur-Darsana. The normal flow of traffic was, however, not maintained and the releases of jute, the most important commodity, in Calcutta area registered a decline in volume, as shown by the following figures :

July to March	*Maunds*
1946-7	9,852,304
1947-8	6,783,567
1948-9	6,432,423

For the Oudh Tirhut Railway no special arrangements had to be made except the provision of through trains between Manihari Ghat and Naksalbari and Manihari Ghat and Malda Court. On Jodhpur Railway through train service between the dominions of India and Pakistan stopped abruptly on 27 July 1948 with 10 Down at Khokhrapar in Pakistan and 9 Up at Munabao, in India.

Vast movement of population from either dominion imposed an unprecedented strain on the Indian Railways and this was accentuated by the staff in each dominion exercising their option for service and moving to the other when the country had not yet emerged from the effects of World War II. The upsurge of consumer demand after the protracted wartime curtailment of civilian consumption, called for the maintenance at least, if not an increase, of industrial production and adequate transport to meet it. The success of the rationing system also depended on the ability of railways to move promptly and regularly large quantities of food to the areas of scarcity. That these important tasks were accomplished by the Railways without any serious dislocation of the country's economy, was a proof of the soundness of the railway system that had been built over the best part of a century.

Assam Rail Link

As the lines in Assam constituted into the Assam Railway, were cut off from the rest of the country, the construction of a railway link had to be undertaken immediately to provide a direct rail route to Assam over Indian territory. Partition also resulted in far-reaching changes in the pattern of traffic. The flow of traffic from and to northern India, which used to be routed to and from Karachi, had now to be diverted to Bombay, thus, increasing heavily the load on the existing lines between Bombay and Delhi, even in excess of the capacity for which they were designed.

In pre-partition days, Pathankot was a terminus station for the broad gauge, and a starting station for narrow gauge Kangra Valley Railway. It served the requirements of Kulu, Dharamsala and Dalhousie and other hill stations in the area through road transport agencies. The direction of flow of traffic was mostly to and from Lahore which became part of Pakistan. The traffic needs of Jammu and Kashmir were met by railheads at Rawalpindi (in Pakistan) and Jammu, both directly connected with Lahore. With the partition of the country Jammu and Kashmir territories were deprived of these two routes and hence were cut off by land from the rest of India. A road from Pathankot to Jammu across the Ravi river was opened to traffic soon after partition and thus, Pathankot was expected to

meet the additional demand of Jammu and Kashmir traffic. The direction of flow of traffic, instead of being from and to Lahore, as it was before partition, changed to and from Delhi, creating several problems of line capacity.

One of the first tasks to be undertaken by the government of independent India was to link the Assam Railway with the rest of the Indian Railway system. The Assam Rail Link Project was taken up towards the end of January 1948. Its completion by 26 January 1950 in the face of formidable difficulties of a submontane region, thick forests, heavy rainfall and turbulent rivers, was a remarkable feat of engineering.

The link consisted of four different sections as under :

Kishanganj-Siliguri—Conversion of 106 kilometres of existing 2′—0″ gauge railway to metre gauge.

Siliguri-Bagrakote—Provision of a new metre gauge connection about 35 kilometres long including a major bridge over the Tista river.

Madarihat-Hasimara—Provision of a new metre gauge connection about 14 kilometres long including a major bridge over the Torsa River.

Alipur-Duar-Fakiragram—Provision of a new metre gauge connection 72 kilometres long including two major bridges over the rivers Sankosh and Raidak.

The old 2′—0″ gauge railway on the Kishanganj-Siliguri section was for most of its length laid like a tram line on the berm of a road. For the new metre gauge line bridges, buildings and other structures had to be renewed almost wholesale. Work on this section, therefore, was not conversion from one gauge to another, but practically the construction of a new metre gauge railway.

The 227-kilometre route of the Assam Rail Link passed through thick malarial jungles which had to be cleared before surveys could be made, formation prepared, bridges built, track laid, and ancilliary services provided for train running. Between the two ends, the alluvial plains of East Bihar and West Assam, lay the foothills of the mighty Himalayas studded with boulders and shingle. The alignment broken by deep cuts lay across the drainage of the country and the major problems was to bridge 368 channels varying in size from 1 metre to 430 metres. This had to be accomplished

within one working season of six months, in an area where rainfall usually exceeded 635 centimetres per year. The Engineer-in-Chief of the work was Sardar Karnail Singh, who later on rose to the position of Chairman of the Railway Board.

Including the Tista, Torsa and Sankosh, there were twenty-two rivers which required deep well foundations for constructing bridges. For other flood openings and hill streams, steel girder bridges on masonry abutments and piers were constructed. Heavy boulders up to two metres in diameter, and buried tree trunks were the usual obstacles encountered in well sinking. Steel girders of the Indian Railway Standard type and Army Standard Truss type were used for spanning bridges. In three bridges, however, pre-stressed concrete girders of 18.30 metre and 12.20 metre spans were cast *in situ*. These were cast and employed for the first time under railway loading in India, and this was considered a remarkable and unique achievement in bridge building. The entire project was completed at a cost of Rs. 890 lakhs being an average of Rs. 3.90 lakhs per kilometre.

Mukerian-Pathankot Line

Next to the Assam Rail Link, the strategic rail connection which had to be provided urgently was the extension of the Jullundur-Mukerian Branch line to Pathankot so as to bring Jammu and Kashmir closer to India.

Work on the 44-kilometre Mukerian-Pathankot line was started in November, 1949, and it was formally opened to traffic on 7 April 1952. The territory traversed was fertile and surplus in foodgrains, namely rice, wheat and maize. The line cut short the distance between Delhi and Pathankot (the gateway to the Kashmir and Kulu valleys) by 71 kilometres. The project cost Rs. 3.77 crores mainly because of the heavy bridging involved, the total number of bridges being 108. Beas and Chakki bridges by themselves absorbed nearly fifty per cent of the total expenditure.

Kandla-Deesa Line

After the partition of India and the loss of the port of Karachi the necessity for a major port on the west coast of India was keenly felt. Kandla, in Cutch, was considered a suitable site. The township near it was named Gandhidham. In November 1949, the Government of India ordered the construction of a metre gauge line between Kandla and Deesa,

the then existing terminus of the metre gauge railway. Work was commenced in January 1950 on the 274-kilometre line and it was formally opened for traffic by the President of India on 2 October 1952.

While the country traversed between Deesa and Varahi was generally flat and fertile, between Adesar and Bhachau, the line passed through rocky undulating land, where a large number of bridges had to be built over several nullahs and rapids. Between Bhachau and Gandhidham the line gradually sloped down towards the sea. Banas river, the largest waterway crossed by the new railway, had a vast catchment area, most of which lay in the Aravalli hills. The bridge over this river was the largest on the line consisting of 14 spans of 24.8 metre plate girders carried over mass concrete piers and founded on single 6.82 metre diameter concrete wells.

A National Institution

Political independence led to the awareness that the Indian Railways must be adapted to the role of a truly national institution. The advisory councils, both at the centre and at the headquarters of individual railways persued matters to rectify past practices which emphasised racial and communal differences. The Central Advisory Council at its sessions held in 1947-48 urged the abolition of the distinction between first and second class refreshment rooms, some of which were earmarked for serving food in European style. Another reform sought was the elimination of communal labels to drinking water at stations so that after 1948 there was no "Hindu Pani" or "Mohamadan Pani" at railway stations in India.

To improve the image of the Indian Railways, PR was strengthened. In January 1948, a Public Relations Branch under a Joint Director was created in the Railway Board's Office to co-ordinate the work of the Public Relations Offices at all railway headquarters. Towards the end of the financial year, there were Public Relations Officers at Calcutta, Bombay, Madras, Delhi, Gorakhpur and Pandu.

These and several other measures required to upgrade the working of railways to meet the needs of a rapidly expanding economy naturally required considerable expenditure. Apart from large sums required for some of the non-recurring items such as the new strategic links described above, expenditure also shot up on the recurring side in 1950-51. As compared to pre-war figures, the wage bill alone had trebled. The cost of renewals and replacements had registered a similar increase. The charges for fuel had gone up by about 400 per cent. Railway earnings had also

registered a steep and unprecedented rise, but could not always keep pace with expenditure. In 1949-50, working expenses had risen by 264 per cent, a way ahead of the increase in the gross earnings of 190 per cent.

The Indian Railways were now on the threshold of the completion of a century of service to India. The occasion was celebrated in a befitting manner, culminating in a Centenary Exhibition on a grand scale in New Delhi to highlight the achievements of the lifeline of the nation. Here a pause will be appropriate to have a look at the sound financial position of the railway undertaking. During 1951-52, the year preceding the centenary landmark, the gross traffic receipts of the Indian Government railways were Rs. 290.82 crores—the highest ever reached till then representing an increase of 27.81 crores over the figures for 1950-51. Passenger earnings amounted to Rs. 109.88 crores and goods earnings Rs. 156.79 crores the balance of Rs. 24.15 crores being made up of other coaching and miscellaneous earnings. The working expenses amounted to Rs. 194.04 crores, being 13.81 crores above the figure for the previous year. The appropriation to the Depreciation Fund was Rs. 30.00 crores. The operating ratio at 77 per cent was thus, the lowest since 1947-48.

After meeting all charges, including the appropriation to the Depreciation Fund the net revenue on the results of working for the year amounted to Rs. 61.75 crores. Of this Rs. 33.41 crores were paid to general revenues as dividend. The net surplus for the year thus, amounted to Rs. 28.34 crores as against Rs. 15.05 crores in 1950-51 and 14.59 crores in 1949-50. Of this Rs. 10 crores were allocated to the Development Fund and Rs. 18.34 crores to the Revenue Reserve.

"An Astonishing Change"

Besides meeting their own needs for rehabilitation, expansion and development, the railways, as the then Minister of Transport and Railways pointed out, had in the past, lent impressive support through the three earmarked fund balances to the general ways and means position of Government. That support expressed in terms of money, was of the order of Rs. 121.71 crores at the end of 1948-49 and Rs. 129.63 crores at the end of 1949-50. Quite apart from this direct assistance to general finance, the indirect help had been rendered by railways, by limiting their own demand on the balances of their reserve funds, so as not to curtail the resources of Government for national developmental activities in the realms of agriculture, industry, and other forms of transport. Railways had thus, speaking broadly, rendered an important service to the nation in sustaining

the momentum of economic progress. Nothing can describe more appropriately, the achievements of the railways during this period of transition, than what the Prime Minister Jawaharlal Nehru said at the inaugural ceremony of the Northern, North-Eastern and Eastern Railways in New Delhi on 14 April 1952. He said :

> "I remember five years ago or about that time when the question of the then state of the Indian Railways came up repeatedly before us—before the Government, before the Cabinet. It was an obnoxious state, after the war, with our resources depleted, with all kinds of rolling stock and lines sent to Mesopotamia and other distant parts of the world, with no replenishments and no renewals, and with a terrific traffic. In fact, it was a painful experience not only to travel but to see other people travelling. It was hardly conceivable, and I would not have believed it if I had not seen it myself, how many people were jammed in into our third class compartments sepecially, and to some extent in the other classes also. So far as goods were concerned, I believe mountains of them piled up in our ports, and I remember in Bombay there was an astounding accumulation, and industries suffered, business suffered, everybody suffered ; it was a scandalous state of affairs that many people whose goods lay there had to pay some kind of demurrage, and yet they could not take them away.
>
> That was the state of affairs about five years ago. Soon after that, some months after that, came the Partition, which involved the sudden overnight break-up of the railway system in the northern and north-eastern parts of India. That was a big blow—a big blow at a time when we were just staggering under the weight of the effects of the war. Immediately after the Partition, in fact contemporaneously with it, came the huge migrations—those millions and millions of refugees coming or going—either from Pakistan to India or from India to Pakistan : a tremendous thing ; and nobody who saw that migration either by train or by road or otherwise can ever forget that astounding and ghastly picture. Trains not merely full inside, but full to the brim on the roof, on the foot-boards, everywhere—filled with suffering humanity. It was an awful sight.
>
> All this burden fell on our railways just when they were least capable of carrying even their normal burdens. And yet we survived, and the railways survived. And one has only to see them now to see how they have risen and overcome all that multitude

of difficulties—not only over-come those problems and difficulties, but built themselves anew—and are functioning now with a large measure of efficiency and punctuality. In the old days—I call them old days although it was only four or five years ago—trains were late by hours and hours, and nobody knew when they would arrive.

It is an astounding and astonishing change that has taken place and I think that we should not only take note of that change, and I hope even our worst critics will note that change—but also think of how that change has been brought about and on whom the burden of bringing about that change has lain......you can well presume the enormous amount of hard work and co-operative hard work that has gone into this business and I think we as a people, we as a Government have every reason to be proud of this work and to congratulate all those connected with our railways for what they have done."

As the above excerpts indicate, the Indian Railways were on the threshold of important structural changes, the momentous character of which merits a separate chapter which follows. With a heartening record during the first hundred years, Indian Railways entered their second century of public service with confidence and hope. The fortitude and success with which they faced the many formidable difficulties of the two wars and the partition of the country, when they were far less self-sufficient than at present, promised well for their ability to provide India with a transport lifeline through which her future prosperity could be built.

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Regrouping of Railways

Next to the building of vital links described in the last chapter, the other important step taken towards the consolidation of the Indian Railways after Independence was the regrouping of different lines of varying lengths owned and managed by the Government of India, owned by the Princely States but merged with the Indian Government Railways, and lines belonging to the Princely States which had been formed into centrally administered areas. Before describing how regrouping was achieved, it would be desirable to study its historical perspective.

The idea of grouping the railways on a national scale was first mooted in the twenties. The proposals for the re-organisation of Indian Railways fell, broadly speaking, into two categories. One advocated a redistribution on a provincial basis, whereas the other deprecated the division based on political considerations. As such sentiments are aired every now and then in the Indian body politic, the reasons why the first proposal was given short shrift may be mentioned before proceeding to discuss the second type of regrouping proposal, recommended by expert committees.

The Government of Madras, in their written evidence to the Acworth Railway Committee, appointed in 1920 to examine the working of the Indian Railways, made a definite proposal that Railways in India be grouped into eight systems of reasonable size, one such being created in the Madras Presidency by the amalgamation of the South Indian and the Madras and Southern Mehratta Railways. The mere provincialization of the lines was no remedy for the problems of railway organisation, as the movement of traffic in the twenties was dictated by influences which had no connection with provincial boundaries. Transport had become national,

not local, and was related to economic activity which could not be confined to the provincial strait-jackets. The committee, therefore, rejected the proposal of the Madras Government.

Examination by Expert Committees

During the period 1920-48, several committees had examined railway working and recommended amalgamation or regrouping of Indian Railways as an important step towards effecting economies and enhancing efficiency. The Acworth Railway Committee was the first authoritative body to recommend a regrouping of all the railways of the country. It had proposed a grouping of Indian Railways into three divisions : Western Division, Eastern Division and Southern Division, each under a separate Commissioner. The next expert committee headed by Lord Inchcape asked for an amalgamation of the railways into five groups in the manner of the British experiment. In Great Britain, twenty-seven constituent companies and about a hundred other subsidiary lines had been regrouped into four main line systems.

National Viewpoint

The question of regrouping was discussed in the Central Legislature in March 1924. More than one Member of the Assembly referred to the subject while debating the Budget Estimates. Sir Purushotamdas Thakurdas, who had served as member of the Inchcape committee, said :

> "Both the Committees (Acworth and Inchcape)...lay very great stress on it (grouping of railways) and the Inchcape Committee particularly said that the Railway Department here should attend to it forthwith. They also thought that great economies could be effected by the grouping of railways and that it would be rather interesting to know how much more time the Railway Departments are likely to take before any further substantial step is taken or a policy decided in connection with this unanimous recommendation of these two Committees."

The views of the Railway Board on these proposals (Acworth and Inchcape) were contained in Mr. F. A. Hadow's (then Chief Commissioner for Railways) Memorandum of 16 June 1925 which stated :

> "...While there is much to be said for the idea of the study of railway problems on a territorial basis, I am strongly of the opinion that the more practical way of achieving the object is to

gradually consolidate the railway systems in each of the broad geographical and commercial areas under strong and responsible administrations properly linked together and coordinated under the general control of the Railway Board. The Inchcape Committee directed attention towards the desirability of grouping of railways on somewhat the same lines as has been effected in Great Britain. I do not propose to more than touch on this subject in this Report, but it may be mentioned that while such opportunities as arise are taken, as for instance the transfer to State management of the East Indian and the Great Indian Peninsula Railways, of rearranging and consolidating on a logical basis the systems under our control, we realize that it must take a long time to effect any large rearrangement of the various systems owing to the currency of the company's contracts."

British Resistance to Re-grouping

The British regime in India obviously wanted to delay regrouping as long as possible as it was unwilling to terminate the contracts of the London-based companies and take over the major lines under State management. It was, therefore, chary of making any large scale changes in the organization, and the pretext used was they would result in dislocation.

In 1933, the Pope Committee recommended the amalgamation of workshop resources between the Great Indian Peninsula and the Bombay, Baroda and Central India Railways in Bombay and between the East Indian and the Eastern Bengal Railways in Calcutta. This recommendation had little chance of being implemented as both the Bombay and the Calcutta based railways had conflicting interests in the field of traffic.

Less than three years later, the Wedgwood Committee observed : "If the administrations are unduly extensive, headquarters supervision becomes unwieldy. The *esprit de corps* of such overgrown concerns is weakened and they lose the individuality, that comes from direct personal initiative at the top." The ultimate grouping, the committee said, should be to combine the Eastern Bengal and the Assam Railways into one and the Madras and Southern Mehratta and the South Indian Railways into another so as to reduce the number of railway administrations in India from ten to eight. The committee hesitated to recommend any immediate regrouping because "amalgamation of railways or the transfer of parts of one system to another always results in a temporary loss of efficiency, the two reasons for this being the adverse effect on the prospects of advancement of some sections of the officers and staff concerned and "inevi-

table changes in the system of organisation of the new and enlarged system." The Committee, therefore, felt that "it would be wrong to make any general recommendation for the regrouping of railways. The railway systems must be left to work out their own individual salvation and to regain the degree of operational efficiency that the country requires." At the bottom of this view point was the same lurking fear as had motivated the Chief Commissioner for Railways in 1925 that regrouping would entail the termination of the contracts of the British companies who managed sizeable railways in this sub-continent.

The Public Accounts Committee of Parliament, while examining the Accounts of 1934-35, desired that the Railway Board should examine the possibilities of making a saving in administration and operation of railways owned by the State by a judicious amalgamation of the various systems on the analogy of the amalgamation carried out in Great Britain :

> "We are of opinion that the railway systems in India can easily be reduced to six or four, and recommend that this should be done as early as possible, provided it involves no financial deterioration."

Post-partition

In the Interim Budget Session, immediately after Partition, the Minister for Transport and Railways observed : "The result of Partition is that we have now five different units in the area covered by Partition. There is the Eastern Punjab Railway which is now a separate administrative unit directly responsible to the Railway Board, the East Indian Railway, the Oudh-Tirhut Railway, the Indian portion of the old Bengal and Assam Railway and the Assam Railway . . . The question of regrouping involves three principles. First of all, railways have to be arranged in such a way as to promote operational efficiency, secondly, it ought to promote administrative convenience, thirdly, it ought to effect economy in controlling and supervisory establishment".

The importance of reorganization of the railways and the difficulties of dealing with the problem as they appeared early in 1949 were again indicated by the Minister for Transport and Railways in his Budget Speech as follows :

> ". . . Among the nine units of Railway Administrations now in existence the route mileage in charge of each varies from 1,231 miles on the Assam Railway to 4,457 miles on the East Indian Railway. Their operating ratios vary within fairly wide limits and

some of them have been living on the others. Their present geographical distribution has grown haphazardly in some cases and they are a product of the history of both State and Company effort in the past. Whether we should interfere with the present grouping at all and, if so, how best to group them with the assurance of giving satisfaction both territorially and functionally is a problem which bristles with difficulties . . ."

The rapid integration of the Princely States during 1949-50 resolved in one step the problem of taking over the railways of such states. During 1949-50 eight railways with a total of 890 route miles (1433 km) were merged with Indian Government Railways. On April 1, 1950 the remaining twenty railways of the Princely States formed into Centrally Administered Areas, continuing States (which had remained intact) and Unions of States aggregating a total route mileage of 6,670 (10,739 km) were also brought in. Events had clearly outpaced the earlier hesitation, and the problem of regrouping and the satisfactory administration of a multiplicity of lines varying from 4.9 route miles of the Sangli to 1,396 (2247 km) route miles of the Nizam's State, could no longer be deferred.

Integration of the State Railways

The situation had dramatically altered and rendered the reorganization and final integration of the Princely States' Railways a matter of urgency. The Minister of Transport and Railways made a detailed reference to the subject of regrouping in this context in his Budget Speech for 1950-51 :

> "The other reform which I have been desiring to embark upon . . . is the regrouping of the units of the Indian Railway system. There is need for establishing a smaller number of major units, for introducing a reorganization of the internal set up of each unit, for pulling up standards of efficiency and for eliminating extravagance and effecting economy. The administrative pattern and the levels of maintenance and operation vary even now from one railway administration to another. Federal financial integration, which will result in the taking over by the Government of India the ownership and management of a number of independent State Railways, each with its ow peculiarities, has underlined this need for regrouping and reorganization. The complete nationalization of rail transport under one overall control from the 1st of April next gives us the opportunity for planning and carrying out a policy of uniformity in administrative pattern and financial control, a rationalization of workshop and other operational facilities and an improved standard

of performance. The preliminary investigations for this purpose have been completed and a plan is in the making. It envisages the welding of the different systems into one co-ordinated railway undertaking, divided into as small a number of major zonal administrative units as possible, the determination of the zones having regard to operational efficiency and economy and, what is even more important, the economic inter-dependence of contiguous regions. The set-up of the Central Railway Executive requires to be re-oriented as part of the new plan and, in doing this, we have to consider how far it would be practicable or desirable to separate the central co-ordinating functions which are of a technical character from those which are purely of an administrative nature. When the plan is completed, it is my intention to consult trade, industry and other concerned interests as also the Central Advisory Council, before the Government takes a decision. It is obvious that, for evolving a scheme of this nature, which will so vitally affect the economic life of the country, it is important that it should carry the largest measure of public support."

In 1948-49, prior to the integration of the Princely States with the Indian Union there were 21 railways operated by the Government of India and several Princely States, consisting of 13 major systems called Class I Railways and 8 minor systems made up of 4 Class II and 4 Class III railways. Of the Class I Railways, nine were operated by the Government of India. Four Class I Railways, and seven of the remaining lines were managed by the Princely States. One Class II railway was acquired by and came under the management of the Government of India during 1949-50. A complete list of the lines and their classification is given in Annexure 15-A.

The Railway Board reached certain conclusions regarding the main principles to be followed in deciding on the final plan of regrouping. First each railway system should be so formed as to serve as far as possible a compact region. Second, the system should be large enough to support a headquarters organization of the highest calibre capable of following and assimilating up-to-date improvements in railway technique ; and equipped with adequate workshop facilities and statistical training and research institutions. Third, regrouping should cause the minimum disturbance to the existing arrangements and should be so phased as to prevent any kind of dislocation or even temporary diminution of efficiency. These hopes were not realised as serious problems relating to the absorption and gradation of staff were created and these took years to resolve.

The Final Picture

The scheme contemplated the regrouping of Indian Railways to form six zones of administration. The total mileage of Indian Railways was 34,079 (54, 833 km) and each zonal administration was to control between 5,000 (8,050 km) and 6,000 route miles (9,660 km). The post-Independence process of regrouping commenced with the formation of the Southern Railway 6,017 miles (9681 km) in April 1951. This comprised the South Indian, the Madras and Southern Mehratta and the Mysore State Railways. The process continued with the creation of the Central and the Western Zones. The former, 5,428 miles (8734 km), was formed with the amalgamation of one state-owned railway, the G.I.P. and three smaller systems owned by the princely states, namely, the Nizam, Scindia and Dholpur. Similarly, four units, the BB & CI, Saurashtra, Rajasthan and Jaipur were amalgamated to form the Western, 5631 miles (9060 km). This phase of regrouping was completed on 1 April 1952, when the Eastern, North-Eastern and the Northern Railways were formed. The creation of these three zones raised a fierce controversy.

There was strong opposition to the proposal to take away the Allahabad Division of the erstwhile East Indian Railway and make it a part of the Northern Railway. There was agitation in Calcutta and an influential parliamentary lobby rose against this move, as Allahabad Division had a sizable proportion of the employees from the State of West Bengal, and this worried the Government, who decided, at the last moment, to delete from the official inauguration brochure the names of the three divisions, Moradabad and Lucknow in addition to Allahabad, that were proposed to be transferred to the Northern Railway and to refer to these as "some divisions of the East Indian Railways".

There was no declaration till the day before the formal inauguration of the three new railways by the Prime Minister, Jawaharlal Nehru, as to which divisions of the old East Indian Railway, would be merged with the new Northern Railway. Even the Minister, Mr. N. Gopalaswamy Ayyangar, refrained from mentioning the names of these divisions in his official address of welcome to the Prime Minister, to whom was left the task of clearing the mist. This is what Nehru said :

> "Personally, being a resident of Allahabad for a considerable number of years, my life was closely associated with the East Indian Railway and I can very well understand the people's feeling a slight pang at the cutting up and the liquidation, if I may say so, of the East Indian Railway as it was . . . I am sorry that in this matter some feeling has been aroused, because on such an occasion, when

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> we are really doing something in regard to the railways in India of which we should be proud there should have been some voices which were rather discordant. But ultimately sentiment must have second place and the public good is more important than sentiment."

The trick worked. Nehru's soothing words brought relief to those who were in anguish over the breaking up of a century old institution. The decision to make Allahabad Division a part of the new Northern Railway zone was, however, sound both from the administrative and the operational points of view.

In the final picture the Eastern Railway with 5,675 route miles (9134 km) was formed by the integration of the Bengal Nagpur Railway with the Sealdah, Howrah, Asansol and Dinapore divisions and Dhanbad Transportation Division of the East Indian Railway. The remaining parts of the East Indian Railway, viz., the Allahabad, Lucknow and Moradabad Divisions were incorporated into the Northern Railway, which in addition included the Eastern Punjab Railway, the Jodhpur Railway, the Bikaner State Railway and Delhi-Rewari-Fazilka section of the Western Railway. The Northern Railway had a route mileage of 6,017 miles (9,681 km). The North Eastern Railway was formed by the merger of the Oudh Tirhut Railway, the Assam Railway and the Kanpur-Achnera Section of the Western Railway. The total route mileage of the North Eastern Railway was 4,787 miles (7,702 km). According to the Administrative Report on Indian Railways for 1952-53, in carrying out the regrouping scheme, care was taken to ensure the least dislocation in, and the minimum disturbance to, actual working during the process of integration. As no vital change was made in the existing District or Divisional pattern on which the constituent railways were organised, the machinery at the lower levels was kept intact and unaffected.

Of the six regrouped railways, the Southern, Western and North Eastern Railways were on the district basis. In order to avoid centralized control becoming unwieldy, these railways were divided into regional units, each of which was in charge of three Regional Deputy Heads of Departments, dealing with Operating, Engineering and Mechanical Engineering functions, to provide for intermediate co-ordination at their respective Regional Headquarters. In the case of the Central and the Northern Railways, the principal constituent units were already organized on the divisional pattern and the remaining units which had been merged with them, lent themselves to being assimilated to the pattern of the larger unit. The Eastern Railway, however, presented the problem of integrating two units, of which the East Indian Railway portion was worked on the

divisional system and the Bengal Nagpur Railway portion on the district system. In accordance with the policy followed in the organization of the other zones, the districts and the divisions in the two portions of the integrated railway were left undisturbed.

In Reverse Gear

Not long after the creation of the six zones, it began to be felt that some of them were too large or unwieldy. The Bengal Nagpur portion of the Eastern Railway had, therefore, to be separated from it in 1955 and created into an independent zone, the South Eastern. Even at the time of the formation of the Eastern Zone on 1 April 1952, the route mileage of the BNR portion was 3,388 (5,451 km) about 50 per cent more than that of the EIR portion. The tonnage it carried and its traffic earnings were only marginally less than those of the EIR. The two railways traversed entirely separate and distinct territories. The logic of geography and statistics, therefore, fully justified the reversal of a step taken in haste.

Similar reasons led to the splitting of the North Eastern into two zones three years later and the creation of the Northeast Frontier Railway which serves the Assam area and is connected with Bihar by a tenuous link. In 1966, the ninth zone, the South Central was carved out of the Southern and Central Railways, which had become too large and not conveniently manageable. In the seventies, four new divisions were created, Hyderabad, Sonpur and Trivandrum to satisfy regional aspirations and Moghalsarai for operational reasons. Another case where political pressure prevailed was the transfer of Sholapur Division to the Central and Guntakul Division to the South Central Railway.

Inadequacies of the Present Structure

The Indian Railways' network of 61,850 kilometres is now distributed among nine zones, varying between 10,977 kilometres of the Northern Railway and 3,739 kilometres of North-East Frontier. Since 1950-51, the capital-at-charge of the Indian Railways has increased ten times, transport output has gone up three times, revenue receipts have multiplied twenty times and the working expenses have followed suit. In addition to the physical expansion as represented by these facts, the faster pace of operations and the social and political pressures to which the railways are being increasingly subjected have shown up certain inadequacies of the present structure.

The control by the head of a zone in charge of 6,000 to 7,000 kilometres of the line, responsible for its overall management, operations, sales, financial integrity, maintenance of a vast variety of assets, industrial and public relations, is remote, denied of any personal contact so necessary to foster an *esprit de corps* in the interest of sound management. The size, by itself is not a hindrance to efficient management, but due to the general managers being constantly subject to regional and political pressure of one kind or the other, the balance of convenience lies in reducing the size of the zones.

Annexure 15-A

Railway Administrations in India alphabetically arranged by Classes according to their gross earnings showing the working agencies, ownership, and route mileage open on 31 March 1949.*

Indian Railway systems have been classified under three Classes for statistical purposes—

Class I Railways with gross earnings of Rs. 50 lakhs and over a year.

Class II Railways with gross earnings of less than Rs. 50 lakhs a year, but exceeding **Rs.** 10 lakhs a year.

Class III Railways with gross earnings of Rs. 10 lakhs and under a year.

Railway system		Lines comprised in the system			
Name	Worked by	Name	Gauge	Route mileage	Owned by
1	2	3	4	5	6
		Class I Railways.			
1. Assam.	Indian Govt.	(*a*) Assam . . .	3′ 3/8″	1,131	Indian Government.
		(*b*) Chaparmukh-Silghat‡ .	3′ 3/8″	51	Branch Line Company under guarantee terms.
		(*c*) Kataknal-Lalabazar‡ .	3′ 3/8″	24	Ditto.

*No reclassification of Railways has been made after 1942 though earnings in many cases have exceeded the limits of gross earnings laid down for Class II or Class III railways.

‡Line guaranteed by the Government of India and also receives a subsidy from the Assam Government.

1	2	3	4	5	6
		Class I Railways—contd.			
		(*d*) Cooch-Behar State . .	3′ 3/8″	33	Indian State.
2. Bengal Nagpur.	Indian Govt.	(*a*) Bengal Nagpur . .	5′.6″	2,463	Indian Government.
		(*b*) Mayurbhanj . .	2′.6″	71	Branch Lines Company under rebate terms.
		(*c*) Parlakimedi Light . .	2′.6″	56	Private body.
		(*d*) Purulia-Ranchi . .	2′.6″	117	Indian Government.
		(*e*) Raipur-Dhamtari . .	2′.6″	55	Ditto.
		(*f*) Satpura . . .	2′.6″	626	Ditto.
3. Bikaner State.	Indian State	(*a*) Bikaner State , .	3′ 3/8″	876	Indian State.
		(*b*) Nabha Section of the Sadulpur-Rewari Line	3′ 3/8″	7	Ditto.
4. Bombay, Baroda & Central India.	Indian Govt.	(*a*) Bombay, Baroda & Central India	5′.6″	1,198	Indian Government.
		(*b*) Nagda-Ujjain . .	5′.6″	35	Indian State.

1	2	3	4	5	6
		(*c*) Gaekwar's Petlad-Cambay (Anand-Tarapur-Section)	5'.6"	21	Ditto.
		(*d*) Gaekwar's Petlad-Cambay (Tarapur-Cambay Section)	5'.6"	12	Ditto.
		(*e*) Bombay, Baroda & Central India	3'. 3/8"	1,968	Indian Government.
		(*f*) Palanpur State . .	3'. 3/8"	17	Indian State.
		(*g*) Champaner Shivrajpur-Pani Light	2'.6"	31	Indian Government.
		(*h*) Godhra-Lunawada .	2'.6"	26	Ditto.
		(*i*) Nadiad—Kapadvanj .	2'.6"	28	Ditto.
		(*j*) Rajpipla State . .	2'.6"	58	Indian State.
		(*k*) Piplod-Devgad Baria .	2'.6"	10	Ditto.
5. East Indian.	Indian Govt.	(*a*) East Indian . .	3'.6"	4,357	Indian Government.
		(*b*) Kanpur-Barabanki & others	3'. 3/8"	6	Ditto.
		(*c*) Santipur-Nabadwip .	2'.6"	17	Ditto.

1	2	3	4	5	6
6. Eastern Punjab.	Indian Govt.	(a) Eastern-Punjab . .	5′.6″	1,483	Ditto.
		(b) Ludhiana-Dhuri-Jakhal .	5′.6″	79	Indian State.
		(c) Rajpura-Bhatinda .	5′.6″	108	Ditto.
		(d) Jind-Panipat . .	5′.6″	26	Ditto.
		(e) Sirhind Rupar . .	5′.6″	31	Ditto.
		(f) Rupar-Talaura* . .	5′.6″	34	Indian Government.
		(g) Kalka-Simla . .	2′.6″	60	Ditto.
		(h) Kangra Valley† . .	2′.6″	68	Ditto.
7. Great Indian Peninsula.	Indian Govt.	(a) Great Indian Peninsula	5′.6″	3,085	Ditto.
		(b) Bhopal-Itarsi . .	5′.6″	57	Jointly owned by Indian Government & Indian State.
		(c) Bhopal—Ujjain . .	5′.6″	115	Indian State.
		(d) Bina-Baran . .	5′.6″	117	Ditto.
		(e) Dhond-Baramati . .	2′.6″	27	Indian Government.
		(f) Ellichpur-Yeotmal . .	2′.6″	118	Branch Line Company under rebate terms.

*Jointly owned by the Government of India and Provincial Government (opened for passenger traffic on 9-10-1948).

†Guaranteed by Provincial Government.

1	2	3	4	5	6
		(*g*) Pachora-Jamner* .	2'.6''	35	Ditto.
		(*h*) Pulgaon-Arvi . .	2'.6''	22	Ditto.
		(*i*) Matheran (Hill) Light	2'.0''	13	Indian Government.
8. Jodhpur.	Indian State.	(*a*) Jodhpur . . .	3'. 3/8''	807	Indian State.
9. Madras & Southern Mahratra.	Indian Govt.	(*a*) Madras and Southern Mahratta	5'.6''	1,091	Indian Government.
		(*b*) Kolar Gold field (M. S. Railway)	5'.6''	10	Indian State.
		(*c*) Tenali-Repalle . .	5'.6''	21	District Board.
		(*d*) Madras and Southern Mahratta	3'. 3/8''	1,712	Indian Government.
		(*e*) Alnavar-Dandeli (Provincial)	3'. 3/8''	19	Ditto.
		(*f*) Kolhapur State . .	3'. 3/8''	29	Indian State.
		(*g*) Jabgli State . . .	3'. 3/8''	5	Ditto.
		(*h*) West of India Portuguese	3'. 3/8''	51	Foreign Country.

*Since purchased by the Government of India on 1 April 1949.

1	2	3	4	5	6
10. Mysore State.	Indian State.	(*a*) Mysore State . .	3′. 3/8″	609	Indian State.
		(*b*) Bangalore-Chik Ballapur Light	2′.6″	39	Ditto.
		(*c*) Kolar District* . .	2′.6″	64	Ditto.
11. Nizam's State.	Indian State.	(*a*) Nizam's State** . .	5′.6″	667	Indian State.
		(*b*) Bezwada Extension .	5′.6″	22	Indian Government.
		(*c*) Nizam's State† . .	3′. 3/8″	671	Indian State.
		(*d*) Dronachellam-Kurnool .	3′. 3/8″	36	Indian Government.
12. Oudh Tirhut.	Indian Govt.	(*a*) Oudh Tirhut‡ . .	3′. 3/8″	3,088	Ditto.
		(*b*) Singabad (mile 35/½) Godagari	3′. 3/8″	35	Foreign Country.
13. South Indian.	Indian Govt.	(*a*) South Indian . .	5′.6″	559	Indian Government.
		(*b*) Shoranur-Cochin . .	5′.6″	69	Indian State.

*Jointly owned by the Mysore Government and Kolar District Board, and guaranteed by the Mysore Government for the District Board.

**Includes Kazipet-Balharshah, Karepalli-Kothagudium and Vikarabad-Bidar and Extension Branches.

†Comprises Hingoli Branch, Hyderabad-Godavery Valley, Parbhani-Purli, Seconderabad. Indian Frontier, Jankampet-Bodhan and Mudkhed-Himayatnagar Branches.

‡Comprises B. & N. W. Zone, R, & K. Zone, Mashrak-Thawe, Tirhut and B. A. Zone, etc

1	2	3	4	5	6
		(*c*) Cochin Harbour . .	5′.6″	4	Unassisted Company.
		(*d*) South Indian . .	3′.3/8″	1,479	Indian Government.
		(*e*) Nilgiri . . .	3′.3/8″	29	Ditto.
		(*f*) Peralam-Karaikkal . .	3′.3/8″	15	Foreign Country.
		(*g*) Pondicherry . .	3′.3/8″	8	Ditto.
		(*h*) Tinnevelly-Tiruchendur .	3′.3/8″	38	District Board.
		(*i*) Travancore (Indian Govt. Section)	3′.3/8″	51	Indian Government.
		(*j*) Travancore (Indian State Section) *including* Quilon Trivandrum Central Extension	3′.3/8″	98	Jointly owned by Indian Govt. and Travancore Durbar (Indian State).
		Class II Railways†			
1. Barsi Light.	Barsi Light Rly. Co.	Barsi Light . . .	2′.6″	203	Unassisted Company.
2. Darjeeling Himalayan-.	Indian Govt.	Darjeeling-Himalayan . .	2′.0″	94	Indian Government.

†Please see footnote ' * ' on page 213.

1	2	3	4	5	6
3. Geakwar's Baroda. State.	Indian State.	(*a*) Gaekwar's Baroda State .	3'.3/8"	308	Indian State.
		(*b*) Gaekwar's Baroda State .	2'.6"	405	Ditto.
		(*c*) Bodeli—Chhota Udaipur .	2'.6"	23	Ditto.
4. Jaipur State.	Indian State.	Jaipur State . . .	3'.3/8"	253	Ditto.
5. Saurashtra.	Indian State.	(*a*) Saurashtra . . .	3.'3/8"	1,097	Ditto.
		(*b*) Okhamandal . . .	3'.3/8"	37	Ditto.
		(*c*) Saurashtra Railway Tramway	2'.6"	140	Ditto.
6. Shahdara (Delhi) Saharan-pur Light	Shahdara (Delhi) Saharanpur Light Rly. Co.	Shahdara (Delhi) Saharanpur Light*	2'.6"	93	Company subsidized by the Govt. of India.

*Receives land only from Government.

1	2	3	4	5	6
		*Class III Railway.**			
1. Ahmadpur Katwa.	Ahmadpur Katwa Rly. Co.	Ahmadpur-Katwa† . .	2′.6″	32	Branch Line Company under guarantee terms.
2. Arrha-Sasaram Light.	Arrha-Sasaram Light Rly. Co.	Arrah-Sasaram Light . .	2′.6″	65	Company subsidized by District Board.
3. Bankura Damodar River.	Bankura-Damodar River Rly. Co.	Bankura-Damodar River† . .	2′.6″	60	Branch Line Company under guarantee terms.
4. Baraset-Basirhat Light.	Baraset-Basirhat Light Rly. Co.	Baraset-Basirhat Light . .	2′.6″	52	Company subsidized by District Board.
5. Bengal Provincial.	Bengal-Provincial Rly. Co.	(*a*) Bengal Provincial . .	2′.6″	33	Unassisted Company.
		(*b*) Dasghara-Jamalpurganj .	2′.6″	8	Branch Line Company under guarantee terms.
6. Bukhtiarpur-Bihar Light.	Bukhtiarpur-Bihar Light Rly. Co.	Bukhtiarpur-Bihar Light . .	2′.6″	33	Company subsidized by District Board.

*Please see footnote ' * ' on page 213.
†Guaranteed by the Government of India.

1	2	3	4	5	6
7. Burdwan Katwa.	Burdwan Katwa Rly. Co.	Burdwan Katwa† . .	2′.6″	32	Branch Line Company under guarantee terms.
8. Cutch State.	Indian State.	Cutch State . . .	2′.6″	72	Indian State.
9. Dehri Rohtas Light.	Dehri-Rohtas Light Rly. Co.	Dehri-Rohtas Light . .	2′6.″	24	Company sudsidized by District Board.
10. Dholpur State.	Indian State.	Dholpur State . . .	2′.6″	55	Indian State.
11. Futwah Islampur.	Futwah-Islampur Light Rly. Co.	Futwah-Islampur† . .	2′.6″	27	Branch Line Company under guarantee terms.
12. Howrah Amta Light.	Howrah-Amta Light Rly. Co.	Howrah-Amta Light . .	2′.0″	44	Company subsidized by District Board.
13. Howrah Sheakhala Light.	Howrah-Sheakhala Light Rly. Co.	Howrah-Sheakhala Light .	2′.0″	20	Ditto.

†Guaranteed by the Government of India.

1	2	3	4	5	6
14. Jagadhri Light.	Jagadhri Light Rly. Co.	Jagadhri Light . . .	2′.0″	3	Unassiated Company.
15. Kalighat Falta.	Kalighat Falta Rly. Co.	Kalighat-Falta† . . .	2′.6″	26	Branch Line Company under guarantee terms.
16. Rajasthan State.	Indian State.	Rajasthan State. . .	3′ 3/8″	179	Indian State.
17. Scindia State.	Indian State.	Scindia State. . . .	2′.0″	294	Ditto.
18. Tezpore Balipara Light.	Tezpore Balipara Light Rly. Co.	Tezpore-Balipara Light . .	2′.6″	20	Company subsidized by District Board.‡

†Subsidy ceased with effect from 1914-5.

16

Managerial Structure

In chapter ten, the assumption of office by the Railway Board in the Department of Commerce and Industry in 1905 was recorded. It then consisted of a President and two Members. The President had direct access to the Governor-General, but little accountability to the Legislative Council. Some other changes were also made in the organisation. Consulting Engineers were replaced by Government Inspectors of Railways, whose duties included, inter alia, the safety of goods and passengers.

In 1919, Chelmsford, Governor-General recommended to the Secretary of State that the Railway Board should be reorganised on the following lines :

"1. The President in general charge and more especially responsible for new projects and the policy of railway development.

2. A Member specialising in Engineering questions, including extensions and developments of existing systems.

3. A member, specially qualified to deal with transportation questions and rates; and

4. A Financial Advisor, who would remain an officer of the Finance Department, but for deliberative purposes, would have a seat on the Railway Board with access to all its proceedings and files. Such an officer would be directly in liaison between the President of the Railway Board and the Hon'ble the Finance Member."

This recommendation was accepted by the Secretary of State in January 1920. It, in effect, amounted, to holding in abeyance the post of the Finance Member of the Railway Board.

The Appointment of a Chief Commissioner

The composition and functioning of the Railway Board came under the scrutiny of the Acworth Committee (1921) and the Inchcape Committee (1923). In accordance with the recommendations of the Acworth Committee, which consisted of a number of railway experts and public men of wide experience, as will be seen from its composition,[1] a Chief Commissioner of Railways was appointed in November 1922, to be solely responsible under the Government of India for arriving at decisions on technical railway questions and for advising Government on matters of railway policy. Under the orders of Government, the Chief Commissioner was charged as his first duty with making proposals for the reorganisation of the Railway Department. His detailed proposals and recommendations were submitted to Government in January 1923 and received final approval with certain modifications in November 1923. The complete organisation was brought into being on 1 April 1924 after the additional financial provision had been voted by the Legislature.

The new organisation was designed with the object of fitting the department for the work of administration of the railways as a commercial concern and was based on the principle of giving it such measure of independence in its management of railway problems as was compatible with its position as a department of Government. The size of the work and responsibility which fell on the department were indicated by the various functions which Government had to fulfil in regard to railways in India, as the direct owner of the large majority of mileage, the controlling authority of three large systems aggregating over 9,000 miles (14,490 km), the predominant partner in the companies which managed the remainder of the trunk system and the guarantor of many of the smaller companies, besides being the statutory authority over all railways in regard to public safety and services to the public.

End of the Board System

The organisation virtually marked the end of the Board system of control which had been in force since the Railway Board was first constituted. The

title "Railway Board" was retained for certain statutory reasons and the Chief Commissioner was President of the Board and also a Secretary to the Government of India. But the power of over-ruling the other members which vested in him enabled certain necessary changes to be made in the method of work, which was divided under the orders of the Chief Commissioner between the Financial Commissioner and other Members, Technical and General. The Board was assisted by four Directors for Civil Engineering, Mechanical Engineering, Traffic and Establishment. Each Director was directly responsible for one or more of the seven branches of the office and had under him one or more Deputy Directors.

The addition of a Financial Commissioner to the Board was one of the first recommendations of the Chief Commissioner to be adopted by Government, having been strongly endorsed by the Inchcape Committee in its report and the Financial Commissioner was accordingly appointed on 1 April 1923. The necessity for such an appointment had been emphasised by the Acworth Committee as the large financial responsibility of the department was sufficient justification for the addition to the organisation of a member competent to advise on questions of great financial magnitude. Stress had also been laid on the necessity for exercising financial control from within the organisation instead of from without and this change was assured by the special position held by the Financial Commissioner who besides being a Member of the Board, was authorised to deal direct with the Finance Member of the Governor-General's Council in all matters of railway finance.

The technical staff, the Directors, were not merely advisors or consultants but were actually responsible for the disposal of the business of the Board, and for dealing with proposals for new works and projects, with traffic problems which came to Government for settlement, with technical standards, questions of safety and inspections and problems connected with personnel. The disposal of these questions in a manner consistent with the responsibilities of the department necessitated delegation of work within the organisation and complete co-ordination between the branches.

Decentralisation

The re-organisation of the department was but the first step in dealing effectively with the larger question of management and government control. The fault of the earlier organisation was the tendency to over-centralisation whereby the Railway Board became overwhelmed with detail

to the detriment of the prompt disposal of larger problems. The ultimate object, indicated by the Acworth Committee, was a large measure of decentralisation to the railway administrations, i. e. to the Agents of State-managed railways and the Boards of Directors of company-managed railways. The central organisation had to be fitted for its task of dealing adequately with major problems, involving as they did a close interweaving of technical and financial considerations and with the organisation adopted in 1923 a beginning had been made in the process of decentralisation.

One of the objects aimed at was the reduction of correspondence with the railway administrations to a minimum compatible with the proper discharge of their functions. The new system of statistics proved of considerable assistance in this respect and a definite trend was established towards dealing with the regular business of railway management by means of periodical returns. By this means the Chief Commissioner and the Railway Department had at their disposal complete information as to the results of working of individual railways aud by communicating these results to all railways which was regularly done, each railway administration was also kept in touch with the work of the other administrations.

At the time of Independence

At the time of partition in 1947, the Railway Board consisted of a Chief Commissioner, a Financial Commissioner and three members in charge of Engineering, Staff and Transportation. There were six Directors, who held charge of Civil Engineering, Establishment, Finance, Accounts, Mechanical Engineering and Traffic. In addition to the Secretary and Deputy Secretary, there were eight Joint Directors, nine Deputy Directors and five Assistant Directors. The Central Standards Office was in charge of a Deputy Chief Controller.

The constitution of the Railway Board has not undergone any major change since then except that the presiding officer, previously designated as President and later as Chief Commissioner, was called Chairman, Railway Board. The Chairman usually holds one of the portfolios depending upon the department from which he is drawn. There had been a tradition on Indian Railways of a civil engineer occupying the position of Chairman and it was only during recent years that this coveted post changed hands between engineers and traffic men. There was an historical back-ground to this. During the nineteenth century and the first quarter of the twentieth, officer cadres were manned by the British. While qualified

engineers holding diplomas or degrees, or officers from the Royal Engineers, were employed in the Civil Engineering Department, officer recruits for the Traffic Department were not drawn from among university men, and were, therefore, at a disadvantage, as compared to engineers, for manning higher posts. Generally, civil or army engineers rose to the position of General Managers and were in line for promotion to the Railway Board as Members.

The Railway Board has had on its establishment other officers to perform diverse functions. The Economic Adviser was positioned soon after Independence in 1947 to guide investigations of fiscal and other trends which had a bearing on the demands for rail transportation. In 1960, five Additional Members to assist the Railway Board in the Commercial, Finance, Mechanical, Staff and Works Department were appointed and gradually the number was increased to seven, additional portfolios of Health and Electrical Engineering having been created. An Additional Member Vigilance, drawn from the civil service, was placed in position in pursuance of the recommendations of a Committee appointed by the Government of India in 1946, that a senior officer should be appointed in each ministry, to head the machinery fighting corruption. These posts of Additional Members were, however, abolished in 1977, but partially resurrected and redesignated as Advisers Finance, Industrial Relations and Electrical Engineering. With the growing volume of legal work, dependence on the Ministry of Law was not considered convenient and one of its officers was drafted to the Railway Board as its legal adviser. The Board has two Directors-General, one in charge of Security and the other to overlook Railways' health services.

Administrative Reforms Commission

In 1967, Government of India appointed an Administrative Reforms Commission to investigate the vast canvas of governmental activities and the commission in turn appointed study teams to investigate different areas. The recommendations of the team on Railways covered all the important facets of railway activities. The Commission emphasised that Railways owned by the nation as its largest public sector undertaking should be enabled to function on sound business principles within the framework of the policy laid down by Parliament. The Efficiency Bureau which the Railway Board had set up in Rail Bhavan a few years earlier was entrusted with the task of processing the recommendation of the Study Team.

ORGANISATION CHART

MINISTER OF STATE FOR RAILWAYS

- MEMBER ELECTRICAL
  - *ED (S & T)
  - ED (Telecom Dev.)
  - ED (R E)
  - ED (Elec. Engg.)
  - ED (Efficiency & Research)
- MEMBER STAFF
  - Advisor(Staff)
  - DG/RHS
  - Secretary (for Estt. matters)
  - ED (Estt.)
  - ED (Mgt. Services)
  - Legal Adv.
  - ED (PC)
  - ED (Vigilance)
  - ED (Admn. Reforms & PG)
  - Director (Official Language)
- MEMBER MECHANICAL
  - ED (Mech. Engg.)
  - EDME (Workshop)
  - ED (PU & WP)
  - ED (Rly. Stores)
- FINANCIAL COMMISSIONER
  - Advisor (Finance)
  - ED (A/Cs.)
  - ED (AD)
  - EDF (Budget)
  - ED (S & E)
  - Economic Adv.
  - ED (PC) (As Associate Finance)
- CHAIRMAN RLY. BD.
  - Secretary (for Admn. matters)
  - ED (Planning)
  - ED (Corporate (Coord.)
  - ED (Information & Publicity)
  - Director (Public Relations)
- MEMBER TRAFFIC
  - DG/RPF
  - ED (Trfc. Transp.)
  - ED (Traffic Commercial)
  - ED (Traffic Tourism)
  - ED (Safety)
  - ED (Coaching)
  - ED (Operations Information Services)
- MEMBER ENGINEERING
  - Adviser/MTP
  - ED (Civil Eng.)
  - ED (Works)
  - ED (Track)
  - ED (Land Mgt.)

* *ED = Executive Director*

The Bureau generally engaged itself on specific studies and reviews concerning operation, traction economics, trends of staff strength, evolution of norms of certain categories of staff, etc.

Railway Reforms Committee

With a view to gearing up the Indian Railways to handle effectively the heavy volume of traffic anticipated during the coming decades, a committee known as the Railway Reforms Committee was set up to examine in detail the working of the railways and suggest improvements. The Committee completed its assigned job in 1984. Its recommendations are under examination and implementation.

The Minister and the Board

The Minister for Railways is usually assisted by a Minister of State and one or more Deputy Ministers. When the Railway Ministry was first created in 1947, it had a Cabinet Minister and a Minister of State. As the Minister of State was dropped by the Prime Minister, following the split in the Congress Party in 1969, a Cabinet Minister and a Deputy Minister piloted the budget and the appropriations through Parliament in February-May 1970. Since then, the position has varied and at times, the Minister has carried on with a Minister of State and a Deputy Minister, or with wto Deputy Ministers, depending upon political exigencies.

The relations between the Minister for Railways and the Railway Board have developed in the course of time depending upon factors like the Minister's status in his political party, his personality and that of the Chairman, and the understanding or the lack thereof, among Members of the Board. The Minister may resolve matters at full Board meetings at which one or more junior ministers may be present, or by discussion with the Chairman or one or more Board Members.

The Minister's contacts are not confined to the Chariman and Members but extend to Directors and Joint Directors. Papers can be submitted to the Minister directly by any of these officers, though important matters will be routed through a Director. There would, however, be exceptions during a session of Parliament when notes have to be furnished to short notice questions and cut motions. Joint Directors, who deal with certain matters independently have direct access to the Minister.

The division of work among the ministers does not follow any set pattern. Attempts made in the past to allot specific subjects to Deputy Ministers have never succeeded. Politicians with whom they have to deal generally consider being asked to see the man next door as like being shown the door. Thus officials, used to organisation and procedure, do not always know who is handling what, but they easily adjust themselves to any circumstances.

Railways under Ministry of Transport

In 1985, the Ministry of Railways was merged into a Ministry of Transport which would deal with all modes of transport, namely the Railways, Surface Transport and Civil Aviation. Each of the three modes of transport was placed under a minister of state, who reported to a cabinet minister of transport. This last post was abolished in 1986. The Ministry of Railways ceased to exist and became the Department of Railways. The chairman of the Railway Board held the additional charge as coordinating secretary in the Ministry of Transport and was relieved of functional responsibility in the Board. Other than Finance which remained under the Financial Commissioner, the major functions, namely, staff, civil engineering, traffic & mechanical engineering were held by four Members.

The Board's decisions on important matters are taken by the committee method. A small body, consisting of five or six Members, can meet frequently, and almost daily, if need be. The Board's decisions are collective, but the chairman's view has precedence over that of his colleagues except the Financial Commissioner who represents the Finance Ministry. The financial powers of the Board are exercised by the Financial Commissioner subject to the general control of the Minister for Transport and the Minister of Finance. This arrangement enables the exercise of financial control over the Railways not only from without, but also from within, and by an officer responsible for the promotion of efficiency and economical working of the department. The Financial Commissioner has direct access to the Finance Minister whom he keeps posted with developments in the Department of Railways.

The Board has a dual function : as the highest executive for the technical supervision and direction of the railways and as a department of the Central Government. As a department, the Railway Board exercises full powers of the Government of India including control of the railway budget and finances.

The Railway Board is responsible not only for the control and co-ordination of maintenance and operation of the railways but also for planning the development of the system and future construction. It has a full fledged Directorate of Planning which guides studies in planning on the zonal railways in co-ordination with other Ministries of the Union Government. The Chairman and the Financial Commissioner frequently attend meetings of the Planning Commission and other Ministries to consider financial allocations for new projects, expansion and development.

The Board works in close co-ordination with other economic Ministries for the formulation of programmes for the planned and co-ordinated movement of the products of agriculture, forests, animals, mines, mineral oils, and manufactures. It holds frequent meetings with the Ministries of Food and Agriculture, Petroleum and Mines, Steel and Industrial Development to discuss their requirements of rail transportation to make the optimum use of available rail capacity. The projections made by these bodies and the surveys carried out by the zonal railways and the Board's Economic Adviser guide the Board in formulating plans for the expansion of the railway system.

The Board also works in close liaison with the Ministry of Defence to provide support to the logistics of the defence services who are largely dependent upon the railways for movement of personnel and stores. During military operations such functions of the Board receive top priority and call for close day-to-day coordination between the two Ministries.

Functions of Directors

There has been quite a proliferation of Directors since 1947 and their number has mounted to nearly thirty. These fall into three broad categories. Some directors look after subjects which represent new responsibilities that the railways have accepted, namely Health, Metropolitan Transport, Tourism, Electrification and Security. In the second category fall such posts as Directors in charge of Finance, Stores, Planning, Efficiency Bureau and Statistics, which should be considered necessary as modern tools of management. The post of Director, Safety was created in 1964, in pursuance of a recommendation of the Railway Accidents Enquiry Committee, 1962, so that prevention of accidents and investigation, specially in the psycho-technical sphere, could receive greater attention. For some time, the work of passenger operation was tagged on to this post and it was redesignated Director, Safety and

Coaching. The remaining posts of directors, such as Accounts, Electrical Engineering, Establishment, Mechanical Engineering (Production and Development), Signalling and Tele-communications, Traffic (Commercial) and Tourism were the outcome of the increase in the volume of work, necessitating the bifurcation of some departments or because of the need for having specialists to deal with technical subjects.

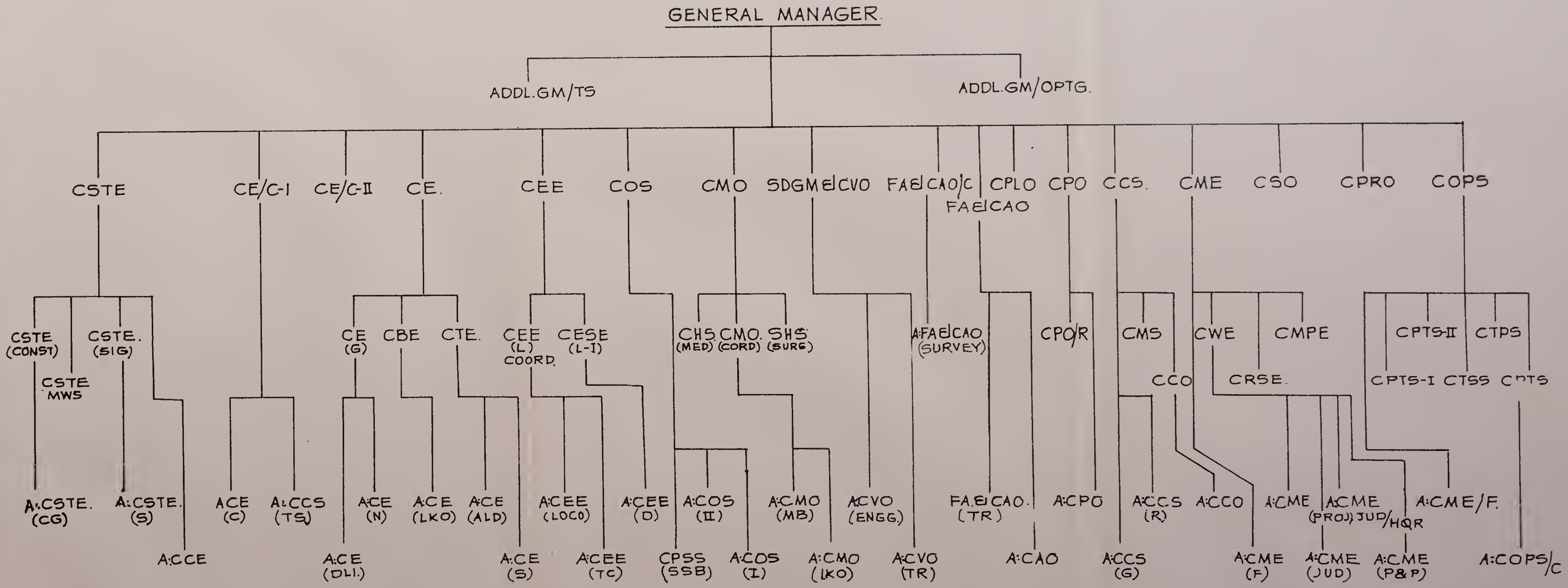
The Zones

The Indian Railways are divided into nine zones : Central, Eastern, Northern, North-Eastern, North East Frontier, Southern, South Central, South Eastern and Western. Each zone is headed by a General Manager who is responsible to the Railway Board for the operation, maintenance and financial viability of his zone. General Managers have been delegated fairly wide powers in matters relating to engineering works, purchase of stores, establishment, public claims for compensation and refunds. There is no limit on the powers of a General Manager to spend money in restoring communications interrupted by floods and accidents, to satisfy claims for compensation for goods lost or damaged, to sanction new works within the budget allotments made by the Railway Board and to purchase stores including proprietory articles.

When the railways were regrouped in the early fifties and larger zones were formed, the General Manager was provided with a Senior Deputy to assist him in the discharge of his enlarged responsibilities. To begin with Senior Deputy General Managers were entrusted with important functions and were authorised to act for the General Manager when the latter was not readily available and matters had to be decided quickly. The working of this arrangement, which involved sharing of responsibility, led at times, to confusion. Most General Managers, therefore, restricted the functions of their senior deputies to non-core activities such as vigilance, public relations and work study.

Under some of the Senior Deputy General Managers, work study was developed as an important tool of management. The project studies were taken up with the primary object of achieving greater efficiency and increasing productivity by application of improved methods. Implementation of Works Study recommendations resulted in considerable increase in efficiency besides saving in revenue and capital expenditure.

On a re-organisation which took place in 1979, additional senior posts were created both at the headquarters of a zonal railway and under


GENERAL MANAGER.
ADDL.GM/TS
ADDL.GM/OPTG.
CSTE
CE/C-I
CE/C-II
CE.
CEE
COS
CMO
SDGM&CVO
FA&CAO/C
FA&CAO
CPLO
CPO
CCS.
CME
CSO
CPRO
COPS
CSTE (CONST)
CSTE MWS
CSTE. (SIG)
CE (G)
CBE
CTE.
CEE (L) COORD.
CESE (L-I)
CHS (MED)
CMO. (CORD)
SHS (SURG)
A:FA&CAO (SURVEY)
CPO/R
CMS
CCO
CWE
CRSE.
CMPE
CPTS-II
CTPS
CPTS-I
CTSS
CPTS
A:CSTE. (CG)
A:CSTE. (S)
A:CCE
ACE (C)
A:CCS (TS)
A:CE (N)
A:CE (DLI.)
A:CE (LKO)
A:CE (ALD)
A:CE (S)
A:CEE (LOCO)
A:CEE (TC)
A:CEE (D)
A:COS (II)
CPSS (SSB)
A:COS (I)
A:CMO (MB)
A:CMO (LKO)
A:CVO (ENGG.)
A:CVO (TR)
FA.&CAO. (TR)
A:CAO
A:CPO
A:CCS (R)
A:CCS (G)
A:CCO
A:CME
A:CME (F)
A:CME (PROJ)
JUD/HQR
A:CME (JUD)
A:CME (P&P)
A:CME/F.
A:COPS/C

the Divisional Superintendents, who were redesignated Divisional Railway Managers. A General Manager in charge of a territorial zone is now assisted by two Additional General Managers and several functional Heads of Departments at the headquarters and Divisional Railway Managers on the line. The principal Heads of Departments are the Financial Adviser and Chief Accounts Officer, Chief Operating Superintendent, Chief Commercial Superintendent, Chief Engineer (Civil) and Chief Mechanical Engineer.

Other heads of departments are designated as Chief Personnel Officer, Chief Signal and Telecommunications Engineer, Chief Electrical Engineer, Chief Medical Officer, Controller of Stores and Chief Security Officer. Lately, most departments have been split into two or more branches on a functional basis and each function is assigned to a Head of Department. For instance the Operating Department has a co-ordinating Chief in overall charge and four heads to handle the freight business, passenger business, planning and safety. A typical chart showing the organisation of the Northern Railway is included in the book.

The Departmental System

A railway zone is divided into a number of divisions, each headed by a Divisional Railway Manager. The divisional system has been evolved over half a century. In view of the multiplicity of organisational patterns on which company railways were fashioned, the introduction of organisational uniformity was a slow process. The recognizable system of working on the company railways was the district or departmental system, under which the administrative headquarters of a railway was divided into a number of major departments, namely, Traffic, Civil Engineering, Mechanical Engineering and Accounts, each under a functional head. The Traffic Department controlled both operating and commercial functions. The Civil Engineering also included Signals and Telecommunications, while the Mechanical Department was responsible for workshops and line maintenance of rolling stock, including electrical equipment. Other functions such as purchase of stores, watch and ward and medical, were overseen by the General Manager or by a Deputy. Each functional head had under him a number of district officers, each in charge of a district, the territorial jurisdiction of which was not necessarily coterminus for different departments. Personnel work pertaining to staff on the line was handled by the district officers who exercised complete control over the employees. The accounts department did not have any officers in the field and functioned from the Headquarters. The role of the Chief Accounts Officer as a Financial Adviser had not yet crystallised.

The Districts

The districts were generally small, from 400 to 800 kilometres, which could be conveniently managed by a single departmental officer or by a district officer and an assistant. As new branches of railway engineering, such as electrical, signals and telecommunications developed, the responsibility for their supervision did not require the posting of whole-time officers. Electrical and Signals Engineers were, therefore, entrusted with the work of overseeing more than one district. The same pattern had to be adopted for the medical department as its work expanded.

The limitation on the use of locomotives within geographical boundaries of districts and the extension of the jurisdiction of the officers of certain departments to more than one district posed problems of co-ordination. Long-distance passenger trains normally ran across district boundaries, but locomotives were changed at the district limits. Freight train operation was confined to district limits, marked by junctions or points of interchange, where such trains were terminated and formed afresh. This method of working placed serious constraints on the full utilization of locomotive power and on the speed of transportation. Operating officers with a limited area of command, had to maintain day-to-day liaison, with their counterparts in adjacent districts, and officers of electrical, signals and medical departments had to work with different sets of colleagues in more than one district whose practices and procedures were different. Yet another area, in which co-ordination was not easy to secure, was the every day functioning of different departments in their own water-tight spheres in the same territory. When differences of opinion that could not be resolved at the district level arose between, say, the District Traffic Superintendent and the District Mechanical Engineer, or between one of them and the District Engineer, the Chief Traffic Manager, the Chief Mechanical Engineer and the Chief Engineer had to sort out things and issue directives to their subordinate officers.

Delay was thus inherent in the departmental system of working. It encouraged a departmental outlook among officers with limited territorial jurisdiction, who were unable to visualise, either the wider responsibilities of their own departments, or the technical difficulties peculiar to other departments. There was a pronounced tendency on the part of departmental officers to protect their staff in matters related to running of trains and accidents, which was a hindrance to safe and efficient operation. The need arose, therefore, for a senior officer, who could direct officers of different departments, to effect co-ordination on the spot and ensure

smooth working of the railway. Different methods were tried to bring this about and these are described below.

The Intermediate Patterns

While the change-over from the district to the divisional system of working was made in one short step on some railways, such as the East Indian, in some other cases, there was an intermediate stage. For instance, in the 1930s, the Bombay, Baroda and Central India Railway combined a few districts into a region and placed it under Regional Superintendents, in charge of Traffic, Civil Engineering and Mechanical Departments. The Regional Traffic Superintendent, being in charge of both the Transportation and Commercial Departments, was answerable to the Chief Operating Superintendent and the Chief Commercial Manager, while the Regional Engineer and the Regional Mechanical Engineer reported to the Chief Engineer and the Chief Mechanical Engineer respectively.

These were officers in the junior administrative grade and being in the field and easily accessible to district officers, exercised supervision at close quarters and co-ordinated the work of districts placed under them, thus overcoming the drawbacks of remote control from an administrative headquarters. The Regional Superintendents of the three departments were also required to co-ordinate inter-departmental activities at their level, but they were not always successful in obviating references to the heads of departments, as the regional system never shed the departmental outlook. Inter-departmental wranglings were often pushed up from the district to the regional level and from the regional to the administrative level.

Another variant that was tried for a few years on the Bengal Assam Railway in the early 1940's was the district-cum-divisional system. When the district system was found inadequate for the pace of operation necessitated by World War II, and the geographical distances and under-developed means of communication made ineffective the control from the railway headquarters at Calcutta of the far flung areas around Chittagong and Tinsukia, a Deputy General Manager was placed at Chittagong and Divisional Superintendents at a few strategic points, such as Dacca and Lalmanirhat to oversee the work of district officers who had operating responsibilities. The Deputy General Manager and the Divisional Superintendents were not given full authority over District Officers, but, being experienced officers they were expected to bring about co-ordination among districts and thus, streamline operation. The district-cum-divisional system, in a some what modified form, with a Deputy General Manager

at Kathiar persisted in eastern India till the introduction of the full-fledged divisional system on the North-east Frontier Railway in 1968-69.

Similarly, the South Eastern Railway, facing transformation from a single track steam-fed line to a diesel-operated double-track system in 1958, found the districts unequal to the task of servicing industrial expansion when the steel industry came up. Two or three contiguous districts were combined to form a region which was placed under a Superintendent with operational responsibilities. The district officers of the Transportation, Mechanical and Commercial Departments were made answerable to him. Later, other district officers were also brought within the purview of the regional system as a stepping stone to full divisionalisation. The difference between the divisional and the regional system was that while, under the former, all divisional officers were posted at one station, that is, the headquarters of the divisional Superintendent, under the latter system, district officers, equal in status to divisional officers, continued to stay at the district headquarters.[2]

To complete the picture of various types of organisation for a working unit as a prelude to full divisionalisation, mention must also be made of the transportation division comprising of the operating department and a part of the mechanical department concerned with the provision of locomotive power. Such a division, placed in charge of an officer of junior administrative grade, functioned independently, as on the Great Indian Peninsula Railway in the 1930s. In some other cases, it was not independent but formed part of a full-fledged division under a Divisional Superintendent of intermediate grade. This kind of organisation was suited to an area with a heavy and concentrated operating workload such as coalmines. It was in force in Dhanbad area for many years during which it formed part of Asansol division. Later, with increase in work, Dhanbad was made an independent division.

The patterns of organisation other than the divisional system are no longer in vogue on Indian Railways. But these are not merely of historical interest as, apart from furnishing evidence of the experiments made in India with different types of administrative units below the level of a railway headquarters, they throw a flood of lights on the evolution of the divisional system. Indian Railways are now fully divisionalized with the North-east Frontier falling in line in 1968-69.

The Divisional System

Two or more districts were combined to form a division which varied from about 500 route kilometres with a high concentration of traffic, such

as the Bombay Division of the Central Railway, to 1900 route kilometres with a load thinly spread out, as on the Bikaner Division of the Northern Railway. A zonal railway, like the North-east Frontier, had as few as four divisions, while the Western due to the heavy workload and the vastness of its territory, had as many as eight. The division thus, became the working unit of a railway. It was placed under a Divisional Superintendent, a high ranking field officer in the inter-administrative grade, later raised to the same level as a Head of Department and designated Divisional Railway Manager.

A Divisional Railway Manager has under him a Senior Divisional Officer in charge of each department corresponding to the organisation at the zonal headquarters. He has thus, with him under the same roof all functional heads available for frequent consultation which enable him to discuss inter-departmental matters with them, settle disputes, promote understanding and foster team spirit, which is sine qua non of a live service organisation. He is able to settle most of the problems of a local character without reference to the zonal headquarters. He is also vested with certain powers to increase establishment, sanction works, issue contracts and purchase stores. He controls and co-ordinates business not only in his own jurisdiction but also maintains liaison with other divisions. He steps in where a divisional officer is not able to carry his counterpart with him. A Divisional Railway Manager functions on the same lines as a General Manager and both have common objectives.

Under the district system of working, each department, self-contained and independent, maintained its own files. Inter-departmental matters were handled through formal correspondence. Even when a Chief Mechanical Engineer sought the instructions of his General Manager, he addressed a formal communication to the General Manager who maintained his own separate office which gave a formal reply. Similarly, in the districts, the District Traffic Superintendent, the District Engineer, and the District Mechanical Engineer, ran their own separate establishments, generally in separate blocks and in some cases at different stations and communicated with each other through formal correspondence.

With the introduction of the divisional system, there was a conceptual change in the machinery of management. A division became a geographical and administrative entity into which merged the departmental organisation at the district level. At the railway Headquarters, the offices of the departmental Chiefs merged into one entity, the General Manager's office. These changes in organisation had to be matched by suitable changes in office management. As the concept of departmental offices, as separate entities

both in the field and at the headquarters, was wiped out, business had to be transacted among them, not by exchange of formal correspondence, but by recording of views and orders in the form of notes, which were passed from one department to another, as used to be the case within a departmental office under the district system.

Extra Divisional Organisations

Indian Railways have large establishments outside the divisional organisation. Reference here is not to the production units which are devoted exclusively to the manufacture of locomotives, coaches, wagons and their components, but maintenance-cum-production workshops which form part of a railway zone. The biggest in size are the mechanical workshops, which are generally situated in two or three places on a railway zone and the largest concentration may have as many as 10,000 men. The workshops and the ancillary services are generally headed by a Superintendent of Mechanical Workshops. There are workshop towns like Kharagpur on the South Eastern Railway which owe their origin to such concentrations. These townships were at one time managed by the railway administration in all respects, namely, municipal services, roads and sanitation, medical aid and licensing.

Similarly, the Electrical Department has workshops for maintenance and production duties, conveniently placed at the same locations as the mechanical workshops, whom they serve. These are controlled by the Chief Electrical Engineer. Though the Civil Engineering Department gets most of its works executed through contractors, it maintains medium-sized shops for fabrication jobs to meet specialised requirements of the railways such as bridge girders and trusses, sleepers and other permanent way fittings, and plants for welding rails. Like mechanical and electrical shops, these are also outside the orbit of the divisional organisation and are controlled directly by the Chief Engineer.

The field organisation of the Stores Department is also independent of the Divisional Railway Managers, and District Controllers of Stores are usually placed along with workshops whom they feed. For other consumers whose requirements are not so large as workshops, stores depots are located at convenient points from where they can service two or three divisions. District Controllers of Stores report directly to the Controller of Stores at the zonal headquarters. They have accounts officers of suitable status attached to them.

While Divisional Railway Managers have Divisional Accounts Officers as a part of their organisation, there are other accounts officers,

outside the orbit of the divisional system, responsible directly to the Chief Accounts Officer. For instance, the Deputy Chief Accounts Officer, who maintains the accounts of transactions relating to goods, passenger and other traffic, will be located centrally to a railway system so that returns may flow into it with the minimum of delay. He may also have some sub-offices at other suitable locations on a railway. These are all independent of the Divisional Accounts Officers who do not concern themselves with transactions relating to traffic.

Rolling Stock and Construction Units

Apart from the nine territorial zones, there are four production and some construction units, each under a General Manager. The production units are the Chittaranjan Locomotive Works, Diesel Locomotive Works, Integral Coach Factory and the Wheel and Axle Plant. The functions of the production units are amply clear from their names. An important construction unit is the Metropolitan Transport Project, Calcutta, engaged in building an underground railway in that city. There are similar organisations, for instance on the Southern and the North-east Frontier Railways, for building new lines on these two zones.

The oldest of the production units is the Chittaranjan Locomotive Works, situated in West Bengal and established in 1950 for the manufacture of steam locomotives. The Integral Coach Factory, to manufacture passenger coaches for Indian Railways, was established in 1955 at Perambur near Madras. The Diesel Locomotive Works at Varanasi in Uttar Pradesh went into production in 1964.

Wheel and Axle Plant

Indian Railways' requirements of wheels and axles was till 1982 met in part by indigenous production and in part from foreign countries. In order to prevent a heavy drain on foreign exchange, the Railways set up a Wheel and Axle Plant at Bangalore, the production at which was expected to start by 1982-83. It was eventually commissioned on 15 September 1984. This Plant is slated to produce approximately 70,000 wheels and 33,000 axles per year.

Central Organisation for Modernisation of Workshops

A Central Organisation for Modernisation of Workshops was set up in 1979 to draw a comprehensive modernisation plan for workshops and to execute this in a phased manner.

Research, Designs and Standards Organisation

More than a century ago, there were a number of small railways in India functioning independently and there was little co-ordination among them in respect of the design of the permanent way, rolling stock and other equipment. With the growth of traffic and the railway network need was felt for the creation of common standards for permanent way, rolling stock, etc. The Indian Railway Conference Association (IRCA) was created in 1903 to enforce co-ordination and standardisation. Subsequently, in 1930, Central Standards Office (CSO) was set up under the Railway Board to standardise designs and specifications for all classes of materials, equipment and rolling stock used by the railways.

After independence in 1947, the upsurge in the country's economic and industrial activities generated an unprecedented demand for rail transport. In order to conserve scarce foreign exchange, it became necessary to develop technological know-how for indigenisation of the various kinds of equipments used by the railways. This led to the formation of the Railway Testing and Research Centre (RTRC) under the Railway Board in 1952. In 1957, the Research Designs and Standards Organisation (RDSO) was created by merging the CSO and the RTRC.

From a modest beginning in 1957, the RDSO has now become a unique organisation among the railway research institutions in the world, having all the disciplines under one umbrella, undertaking a multitude of functions in the field of research, design, standardisation, specifications, inspection, service engineering, consultancy and tests and trials for the benefit of the zonal railways and production units. RDSO also renders inspection and consultancy services to home industry, as well as to railways in other countries. The research activities of RDSO are guided by the Central Board of Railway Research (CBRR) which comprises eminent scientists, engineers, technologists, managers, educationists and senior executives from various research organisations, universities and industries interested in railway technology, material and equipment.

Indian Railway Conference Association

The origin of the Indian Railway Conference Association dates as far back as a hundred years. It was formed to fulfil the need for a central organisation to ensure co-ordination and co-operation amongst the then several private company and State railways. In 1879, that is, 26 years after the first rail had been laid in India, there was a network of 19 separate railway systems, covering a total route mileage of 8,475 (13,645 km), but on account of the lack of a common set of rules and regulations, the user of the rail transport was much inconvenienced. The main drawback was the unwillingness of individual railway systems to permit their own wagons to move over other railways. With a view to overcoming these difficulties, the Director-General of Railways convened a conference of all railways in February 1879 at Calcutta. This was the seed of the organisation which later sprouted as the Indian Railway Conference Association, or 'I.R.C.A.'

The main purpose of the Conference of 1879 was to frame rules for the movement of one railway's wagons over another as, to quote the Government of India's letter dated 13 March 1879, addressed to the Secretary of State for India, "the rules then prevailing were unsatisfactory and in times of brisk traffic were the cause of much friction between companies and inconvenience to the public." This letter further read : "Our first object was, therefore, to remedy this evil and to this end the Conference has framed a revised set of rules for interchange of stock." At this conference opportunity was also taken to discuss the general rules and regulations for open lines ; draft of the Indian Railways Act ; and establishment of Provident Fund for rail employees. Encouraged by the results of the first conference, the Director General of Railways convened such conferences periodically. At these conferences various railway matters were discussed with a view to securing uniformity of practice and procedure.

From the experience of these periodical meetings it was considered desirable to hold regular sessions of the conference. At the 1902 conference it was, therefore, decided to establish a permanent organisation—the Indian Railway Conference Association—independent of the Government. The first session, under the auspices of the new organisation, was held in October 1903. The main business conducted was to define the objects and functions of the Association and to frame rules and regulations in connection there with. The object of the Association as defined in the rules framed at this conference read as ".........The Association is constituted to frame or modify regulations for traffic interchanged

between railways and to Act as a consultative committee and as a board of arbitration".

During the early years, the Association functioned through three main committees, namely (1) Goods Classification Committee ; (2) Audit and Accounts Committee; and (3) Loco and Carriage Superintendents Committee. These committees framed rules for interchange, accountal and maintenance. A Claims Arbitration Committee was also formed to settle disputes regarding inter-railway claims. Besides, an ad hoc committee on tariff simplification was constituted in 1905 and on its recommendations, common goods tariff, military traffic rules and rules for the conveyance of explosives and other dangerous goods by rail, applicable over all railways, were published by the I.R.C.A. in 1910. The first common coaching tariff for all railways was published by the I.R.C.A. in 1920. Similarly, a common set of rules for train examiners was first published in 1911. Another ad hoc committee prescribed standard designs of wagons which came to be known as 'I.R.C.A. Standard'. Later the scope of the Goods Classification Committee was enlarged to cover all matters relating to the Traffic department of railways and the Committee was designated as Traffic Committee.

The general activities of the I. R. C. A. were expanded considerably as a result of a decision in 1926 to have permanent committees and technical sections under the I. R. C. A. covering all spheres of railway working. The former Traffic Committee was replaced by the Commercial and Operating Committees, while the Audit and Accounts Committee continued to function advising on all inter-railway accounting matters mainly relating to traffic accounts. The Loco and Carriage Superintendents Committee was replaced by a technical section of mechanical engineers and additional technical sections were formed relating to electrical, civil, signal, metallurgical and chemical engineering. A section consisting of Controllers of Stores of railways was also formed to give advice on matters pertaining to stores.

Subjects relating to the health and welfare of the railway staff were also dealt with by two separate sections, namely, Medical and Personnel. A separate section was also formed consisting of watch and ward superintendents with the object of ensuring uniformity and co-ordination. The I. R. C. A. Committee and Sections function as advisory bodies. Thus, within a period of about twenty years, that is, from 1925 to 1945, there was practically no aspect of railway working which did not bear the stamp of the I. R. C. A.

With the partition of the country and nationalisation of railways, the need for continued existence of the I. R. C. A. came into question.

At one stage it was decided that I. R. C. A. should be abolished and its functions taken over by the Railway Board. Since 1947 except for the Commercial Committee all other committees have ceased to function. Though it was decided in mid fifties to revive the various Technical Committees, yet the revival did not take effect.

At present, besides the 9 Indian Government Railways, 3 Port Trust Railways of Calcutta, Bombay and Madras and 2 Light Railways are members of the Association. Burma Railway is an Associate Member of the I. R. C. A.

NOTES AND REFERENCES

1. The committee consisted of (1) Sir William M. Acworth, Chairman ; (2) Sir Henry P. Burt, K. C. I. E., President of the Indian Railway Board (1914-5) ; Director of the Indian Railway Companies, India Office (1915-9) ; Chairman of the Bengal and North Western, and Rohilkhand Kumaon Railway Companies ; (3) Sir Rajendranath Mookerjee, K. C. I. E., of Calcutta ; (4) Sir Arthur R. Anderson, C. I. E., C. B. E., President of the Indian Railway Board, 1919-20 ; (5) Sir George C. Godfrey, Agent, Bengal Nagpur Railway Company ; (6) The Hon. Mr. V. S. Srinivasa Sastri, Member of the Council of State ; (7) Mr. E. H. Hiley, C. B. E. formerly of the Great Northern and North Eastern Railways, and later General Manager of the New Zealand Government Railways ; (8) Sir Henry Ledgard of Cawnpore : (9) Mr. Purushotamdas Thakurdas, C. I. E., M. B. E., M. L. C., of Bombay ; and (10) Mr. James Tuke, Director of Barclay's Bank and the British Linen Bank.

2. As Regional Superintendent, in 1958-59, while the author ran Chakredarpur district with all its officers within easy reach, he managed Adra district on long distance trunk telephone occupying the line for an hour or two every day. Eventually, the two districts were converted into two divisions, an inevitable development for a region which lifted one-tenth of the broad gauge loading of the Indian Railways in 1959.

17

Financial Administration

Railways' Contribution to the General Revenue

Until 1924 railway finance was part of the fabric of Government finance ; a loss in any year was borne by the taxpayer and a gain went to the relief of the taxpayer. In the first forty years of the existence of the railways an aggregate loss of Rs. 58 crores was sustained. Thereafter, from 1898 till 1924, practically every year recorded a gain, amounting altogether during this time to Rs. 103 crores. It was during a period of prosperity that the railway budget was in 1924 separated from the general budget, and a separation convention was adopted defining the extent to which contributions were to be made from railway revenues to the general revenues. It will be appropriate to recapitulate here briefly the provisions of that convention ; broadly, it required the railways, after meeting their working expenses, providing for depreciation and paying their interest charges, to contribute to the general revenues as a first charge on surplus profits a sum equivalent to five-sixths of one per cent of their capital, and over and above that a substantial share of any residual profits. It is worth noting at this point that the railways were not in a position to put any funds into a general reserve until they had paid five-sixths of one per cent on their capital in addition to their interest charges.

During the first twelve years after the separation, the railways contributed Rs. 42 crores to the general revenues. The profits from which these contributions were paid were earned in the first half of the period, when the railways were able not only to meet their current obligations but also to build up a general reserve, which in 1928-29 amounted to nearly Rs. 19

crores. In order to meet their obligations during the second half of the period, the railways practically depleted their general reserve, and by 1935-36 had drawn upon the depreciation fund to the extent of Rs. 31½ crores ; in addition a debt of nearly Rs. 31 crores had been accumulated in respect of arrears of contributions due under the convention.

The Depreciation Reserve Fund was instituted at the time of the separation of the railway budget from the general budget of the country in 1924. Annual appropriations were originally made on the basis of the estimated lives of wasting assets applied to the original cost of those assets. Later the basis was changed to one-sixtieth of the capital-at-charge. This change did not, however, materially affect the quantum of the provision ; it was, rather, a new and convenient way of expressing the result produced by the original basis of estimated lives.

The adequacy of this balance cannot be measured by reference to immediate requirements. The object of creating a depreciation fund was to enable regular annual appropriations to be made from revenue, in bad years no less than in good years, for the purpose of meeting expenditure on renewals ; and this expenditure could fluctuate widely in amount from one year to another. It was essential that the fund be maintained at such a level as would permit of exceptional requirements being met ; moreover emergencies likely to make sudden and heavy demands upon the fund could arise.

Separation Convention Revised in 1949

The Separation Convention of 1924 was revised in 1949. The important features of the new Convention were that the general taxpayer was the sole shareholder of the Railways ; the General Exchequer was to receive, for a period of five years, an annual dividend at the rate of 4 per cent on the capital invested out of the General Revenues, provided that no dividend should be payable on the capital invested in unremunerative strategic lines ; a Development Fund, into which was merged the Betterment Fund opened in 1946, was to be instituted for financing expenditure for (i) passenger amenities, (ii) labour welfare works and (iii) unremunerative operating improvements costing more than Rs. 3 lakhs each and (v) new lines, which were considered necessary but were likely to be unremunerative ; for meeting the cost of replacement and renewal of assets, the Depreciation Reserve Fund was to receive a minimum contribution of Rs. 15 crores per annum ; and the railway surplus was to be distributed

among the three railway funds, namely, the Revenue Reserve Fund, known earlier as the Railway Reserve Fund, the Development Fund and the Depreciation Reserve Fund.

The principal reforms brought about by the 1949 Convention were that the General Exchequer was guaranteed a fixed rate of annual dividend on the capital invested in the railway undertaking, irrespective of the changing fortunes of the Railways from year to year ; and the financial stability of the railway undertaking was safeguarded by the provision that the financing of railway projects should be made out of surpluses generated by current revenues to the maximum extent possible, and not by annual additions to capital.

The Convention of 1955

There was a further revision of the Convention in 1955 according to the accepted principle of a quinquennial review. The 1955 Convention modified the rate of dividend payable by the Railways to the General Exchequer to the extent that a lower rate of dividend should be paid on the element of overcapitalization and on outlays on construction of new lines. It raised the contribution to the Depreciation Reserve Fund to Rs. 35 crores annually, and allowed the entire expenditure on unremunerative operating improvements costing more than Rs. 3 lakhs each and staff quarters to be financed from the Development Fund, in addition to earmarking Rs. 3 crores annually for passenger amenities.

The 1955 Convention conferred on the Railways certain advantages : a saving of about Rs. one crore annually due to the lowering of the rate of dividend on that portion of the capital treated as overcapitalization, a lower rate of dividend on investment on new lines, and exemption from payment of interest during the period of construction and for five years after opening to traffic.

Overcapitalisation

The 1955 Convention Committee of Parliament recommended that a precise assessment of the element of overcapitalization be made by the Railway Board and, on such portion of the loan capital, Railways should pay dividend at the rate equivalent to the average borrowing rate charged by the Government of India to the Commercial Department from year to

year. The basic principles for assessment of the element of overcapitalization were laid down by the Railway Board in consultation with the Ministry of Finance and the Comptroller and Auditor General of India. Broadly, expenditure of the following descriptions included in the capital-at-charge of the Railways was to be treated as overcapitalization :

1. Capital representing no tangible asset ; such as premium paid on purchase of old Guaranteed Railways, interest paid during construction, and loss in working during construction.
2. Unremunerative assets charged to capital : the expenditure under this head related to assets like amenities for passengers, staff welfare works and unremunerative operating improvement works which used to be charged to capital, if above a certain limit, prior to the institution of the Betterment Fund on 1 April 1946 which was merged later into the Development Fund.
3. Capitalization of replacement costs : originally, the rule of allocation of replacement was to charge to capital only improvements which were of a revenue-earning character ; but from 1 April 1924, on the introduction of the Depreciation Reserve Fund, this practice was changed and the entire excess cost of replacement over the original cost was charged to capital, irrespective of whether the new assets constituted an improvement or not. This principle was followed upto 1935, after which, the total replacement cost at current prices of like assets or the original cost whichever was greater, was debited to the Depreciation Reserve Fund. The amount representing the excess cost of replacement of assets over the original cost charged to capital from 1924 to 1935 was to be treated as overcapitalization.

The feasibility of creating an amortisation fund came up for consideration of the Convention Committees from time to time. There was no doubt that amortisation would lead to a reduction in the capital liability of the Railways and could, in particular, be applied to reduce the figure of overcapitalization which had been assessed at Rs. 122 crores. Indian Railways were, however, not able to make a beginning in this direction due to their tight financial position, mainly because of the various development schemes that had to be undertaken under successive railway plans to cope with the rapidly increasing transport needs of the country. The change in the allocation rules recommended by the Convention

Committees of 1949 and 1955 had, however, arrested the escalation of the element of overcapitalization.

Dividend Rate Increased

The 1949 Convention had fixed the annual rate of dividend payable by the Railways to the General Exchequer at 4 per cent. No change was made by the 1955 Convention in the dividend rate, but subsequent Conventions have been recommending an increase in this rate so that it went up to 4.25 per cent in 1961 and to 4.5 in 1964. Then came a review by the 1965 Convention Committee which recommended, and Parliament approved, that the rate of dividend be increased from 4.5 per cent to 5.5 per cent on capital invested upto March 31, 1964 and from 5.75 per cent to 6 per cent on capital invested after 31 March 1964.

Convention Committee 1971

The Convention Committee constituted in 1971 recommended :

(i) the exemption from payment of dividend on the capital-at-charge of the non-strategic portion of the Northeast Frontier Railway and of the unremunerative branch lines as also on overcapitalisation ;

(ii) the exemption for a period of three years from payment of dividend on the capital outlay to the extent of 25% annually, when a work was in progress ; and

(iii) the payment of interest to Railways at current dividend rate on fund balances kept with the General Revenues.

These recommendations gave relief to the extent of Rs. 22 crores annually in 1971-72 and 1972-73.

In its report of December 1975, the Railway Convention Committee, recommended the continuation of earlier concessions including the allocation to Capital, instead of the Development Fund, the cost of staff quarters sanctioned for construction during the Fifth Plan, the Railways being liable for payment of dividend to General Revenues on such capital only if they are able to meet their other dividend obligations in full. The Convention Committee became *functus officio* with the dissolution of the Lok Sabha in August 1979.

Thus, railways have no dividend liability in respect of the capital cost of strategic lines, iron ore lines, some railway lines constructed as

part of the national effort at the cost of the General Exchequer, unremunerative branch lines, the element of overcapitalisation identified as part of the capital-at-charge, and on 50 per cent of the capital applied to works in progress, assessed over a period of three consecutive years.

Depreciation Reserve Fund

The desirability of amortisation of the capital-at-charge of the railways was also considered by the 1965 Convention Committee. It recommended the amortisation of the unproductive capital with the interest earned on the balances in the Railway Reserve Fund, being taken in resolution of the element of overcapitalisation, supplemented by such appropriation from Railway Revenues, from time to time, as may be possible on the annual financial results. An amonnt of Rs. 6 crores was withdrawn for amortisation of capital from 1966-67 to 1969-70. The cumulative effect of all these changes was to convert the Depreciation Fund, which was designed to accumulate only the original cost of units of wasting assets, into a Renewal Reserve Fund which bore the entire cost of renewals.

According to the rules of allocation, the Depreciation Reserve Fund bore the cost of replacements and renewals including the improvement and inflationary elements of assets. If the asset replaced was, however, in respect of an unremunerative operating improvement and the cost of such replacement did not exceed Rs. 3 lakhs, it was not met from the Depreciation Reserve Fund but was chargeable to revenue. Thus Depreciation Reserve Fund bore the cost of renewals of track, bridges, girders and rolling stock. Renewals of such items as locomotive fire boxes, fire box plates, axles, tyres, all apparatus and appliances for railway hospitals and dispensaries, ballast, rewiring of the high tension circuits of motor coaches of suburban electric rolling stock, train lighting equipment, etc were not charged to Depreciation Reserve Fund but to revenue. The idea behind charging such assets to revenue was that the replacement of these items on a condition basis was essential for the day-to-day running of the railway regardless of their age, and should therefore be appropriately considered as part of normal maintenance.

Bases on these principles, the annual contribution to DRF, the average annual withdrawals from the Fund, and the final balances since its inception, at intervals of five years, are given in Annexure 17A. The appropriation to DRF from revenue was 920 crores in 1985-86, withdrawals Rs. 870 crores, leaving a closing balance of 155 crores.

Railway Reserve Fund

The Railway Reserve Fund was also a creation of the Separation Convention of 1924, under which railway finances were initially separated from General Finances. The main objects of constituting this fund were :

1. to secure payment of the annual contribution to the General Revenues ;
2. to provide, if necessary, for arrears of depreciation ;
3. for writing down or writing off capital ; and
4. to strengthen the financial position of the Railways so that the services rendered to the public could be improved and rates of fares and freights reduced.

Heavy withdrawals from the Fund during 1929 to 1932, to meet the Railways' obligation to General Revenues during the great world depression, practically wiped out the fund and only a nominal balance was left. During World War II, a fair balance again accumulated in the Fund. A sum of Rs. 12 crores was transferred from the Reserve Fund in 1946-47 to form the nucleus of the Railway Betterment Fund (now the Development Fund) and there were further withdrawals to meet the deficit in 1947-48. As a result of all these transactions, the Fund had a balance only of Rs. 6.8 crores when the first post-war Convention Committee reviewed the position in 1949. The Committee recommended that the name of the Railway Reserve Fund be changed to Revenue Reserve Fund and its scope should be limited to :

1. dividend equalisation, i. e. ensuring payment of the dividend ; and
2. bridging any budgetary gap in the undertaking.

It also recommended that the interest accruing on the Fund should be credited to the Fund and not to railway revenues. During the first part of the Convention period, some appropriations were made to the fund from the railway surplus. But after 1953-54, the accretions to this Fund were solely of the interest on the Fund balances, dividend on amounts invested from the Fund in Branch Line Companies' shares, and Rs. 2.2 crores that it received on the federal financial integration of the Indian States Railways.

The Revenue Reserve Fund was meant for maintaining agreed payments to General Revenues and for meeting deficits, if any, in the working of the railways. From 1978-79 onwards the Fund was to be credited with the surplus which may be left over after :

(a) Appropriation to Development Fund ;

(b) repayment of deferred dividend liability outstanding upto March 1978 (loans taken for this fund and outstanding upto that date have been converted into deferred dividend liability for discharge out of future surpluses). This liability stood at Rs. 40.71 crores on March 1985 ; and

(c) payment against deferred dividend which may accrue from 1978-79 onwards (from 1978-79 onwards, if net revenue is insufficient to discharge full dividend liability the unpaid dividend would be carried forward as deferred dividend liability for payment out of the future surpluses, if any, left after appropriation to the Development Fund).

Development Fund

The Development Fund was initially designed for financing expenditure on :

1. Passenger amenities works ;
2. Labour welfare works costing individually above the New Minor Works Limit of Rs. 25,000 ; and
3. Expenditure on unremunerative operating improvements costing more than Rs. 3 lakhs each and the construction of new lines except strategic lines, which were necessary, but, unremunerative.

The 1954 Convention Committee, however, widened the scope of the Fund so as to include amenities for all users of rail transport. The cost of construction of Class III and IV staff quarters was also to be met from the Fund. A modification was also made in as much as the cost of construction of all new lines, even if unremunerative, was to be met from Capital.

The Committee also recommended that in the event of the Development Fund not being in a position to meet expenditure chargeable to that Fund, money should be advanced from the General Revenues to the Railways for utilisation on such works as were of a developmental nature. Such advances were to be treated as temporary loans to the Railways and were not to be included in the capital-at-charge of the Railways, who were to pay interest on these loans to the General Revenues at the average borrowing rate chargeable to the Commercial Department.

The Comptroller and Auditor General questioned the advisability of financing the Fund by temporary loans from General Revenues. He was of the view that the Fund should rely on railway surpluses and the expenditure therefrom should be restricted to amounts available and for the purposes the Fund was originally created. The Convention Committee of 1960, while appreciating the view of the Auditor General, doubted whether, in a period of developing economy, it would be practical. The Committee, therefore, recommended that the expedient of taking loans from General Revenues may continue, so that there was no curtailment of the scope of works financed from the Development Fund. The Committee also recommended that the Development Fund, besides meeting the cost of labour welfare works, should continue to provide a minimum of Rs. 3 crores per annum for users' amenities.

The Convention Committee of 1965 approved of the continuance of the practice of taking loans from the General Revenues, whenever the balances in the Fund were not sufficient to meet the cost of works chargeable to the Fund. The Committee, however, recommended that the provision for users' amenities be raised from Rs. 3 crores to Rs. 4 crores per annum.

The provision of users' amenities, provided out of the Railway Development Fund was thus raised from Rs. 3 crores to Rs. 4 crores annually for the quinquennium 1966-71. As part of the resolution passed by Parliament, approving the recommendations of the 1965 Convention Committee, this rigid levy placed an unduly heavy burden on railway finances. It was only prudent that money on unremunerative improvements should be spent if Railways generated surpluses. To commit them tightly to an expenditure of Rs. 4 crores a year on users' amenities was tantamount to dealing with the issue not on merits of financial ability but on purely ideological considerations.

Accident Compensation, Safety and Passenger Amenities Fund

Till 1974 payments towards claims from passengers involved in railway accidents were treated as a part of working expenses. From 1 April of that year however, a special Fund titled "Accident Compensation, Safety & Passenger Amenities Fund" was created to cover, in main, the liability to passengers involved in railway accidents. This fund was also to be used to finance expenditure on safety works, such as track circuiting, axle counters, automatic warning system, vigilance control devices, lifting barriers at level crossings, interlocking of level crossing with signals, etc. The Fund was also to meet expenditure on passenger amenities, such as

train indicators, rest shelters for licensed porters etc. It was to be fed with an appropriation of the receipts from surcharge on passenger tickets. An extra charge ranging from 5 paise per ticket for a third class passenger to Re 1 per ticket for an air-conditioned first class passenger was levied to cover the extra liability.

This Fund opened the year 1984-85 with a balance of Rs. 27.95 crores. It received a credit of Rs. 9.09 crores from surcharge on passenger traffic. Besides, an amount of Rs. 1.30 crores accrued to the Fund as interest on balances. The withdrawal from the Fund was Rs. 25.03 crores for safety works and passenger amenities taken together. Thus the Fund closed with a balance of Rs. 13.31 crores.

The Four Funds

From the foregoing details of the four railway funds, it will be seen that replacement works are financed from the Depreciation Reserve Fund, built out of the contributions made yearly from railway revenues. Expenditure on unremunerative works, such as staff quarters, users' amenities and operating improvements is met from the Development Fund, which is built up from the revenues surpluses, after payment of dividend to the General Revenues. Capital works, such as new lines, are financed from the loans taken from the General Exchequer, on which dividend at a predetermined rate, has to be paid.

In addition, works are financed from current revenue under the head Open Line Works (Revenue) or OLWR. According to the rules of allocation, expenditure on works which are not expected to yield a return equivalent to the dividend fixed by Government on the capital invested, but are considered necessary for operational requirements, or fall under the category of developmental works, is chargeable to OLWR, if the cost of a work is less than Rs. 3 lakhs ; and to the Development Fund, if the cost is more than Rs. 3 lakhs. The intention behind this arrangement is that capital should not be unduly burdened with unremunerative investment.

Pension Fund

This fund was created in 1964 to meet the liability on account of pensions to retiring railway employees. It opened the year 1984-85 with a balance of Rs. 428.25 crores including Rs. 28.46 crores transferred to it from the State Railway Provident Fund Account of pre-57 staff who had

elected the pensionary form of retirement benefit before the close of the penultimate financial year. Rs. 225 crores was contributed to the Fund during the year from Railway Revenues and Rs. 4.00 crores from Capital. Rs. 8.26 crores was transferred to the Fund from the State Railway Provident Fund Account of pre-1957 staff who opted for the pensionary form of retirement benefits during the year and Rs. 27.63 crores accrued as interest on the fund balances. Thus the total accretion to the Fund amounted to Rs. 264.89 crores against which Rs. 278.15 crores was withdrawn for payment of pensions. The Fund closed with a balance of Rs. 432.26 crores at the end of 1984-85.

Standing Finance Committee for Railways

A Standing Finance Committee for Railways charged with the responsibility of scrutinising the annual estimates of railway expenditure was formed in 1921 and met frequently during the following 30 years, its deliberations covering a wide range of functions. For instance, the committee met 14 times in 1928-29 and besides scrutinising the capital programmes of railways and discussing the budget proposals for 1929-30, examined the proposals for the construction of 13 projects of new railways, costing an aggregate sum of Rs. 7 crores, and also for the transfer of ownership to the Government of India, on certain agreed terms, of two district board railways in South India, viz. the Salem Suramangalam Railway and the Tanjore District Board Railway.

The Committee also considered various proposals pertaining to railway staff, including the revision of cadres, re-organisation of certain departments and the creation of a number of superior appointments on Indian Railways. It devoted considerable attention to the proposal to adopt as a permanent measure the system of separation of Accounts from Audit on Indian Railways and the rules for the recruitment of candidates for establishments under the Financial Commissioner of Railways. Along with other standing committees this committee was abolished in 1952 and annual estimates have since then been submitted by the Railway Board directly to the Minister.

The Railway Budget

Every year, in mid-February, the Minister presents to Parliament the Railway Budget and details of the actual accounts for the previous year, ended on March 31 ; the revised estimates for the current year which is yet to

run for about $1\frac{1}{2}$ months; and the budget estimates for the ensuing year. He gives Parliament facts and figures in support of his calculations for the current year; enumerates trends in traffic, in the background of the overall economic and industrial situation in the country; gives reasons for violent fluctuations, if any; takes note of abnormal events, such as war or civil commotion, which had a bearing on the level of railway traffic; and presents his estimates of the gross traffic receipts. He also presents his estimates of working expenses and reports to Parliament any increase in the cost of fuel and stores or enhancement in the rates of salaries and dearness allowance and its repercussions on the wage bill, that affected the ordinary working expenses. He also states what contributions and withdrawals were made from the four railway funds. He summarises the budgetary situation in the form of a profit or a deficit for the current year.

He goes through a similar exercise for the ensuing year explaining the measures taken by the railways to improve efficiency, give better service to the public and effect economies. If he has to forecast a deficit for the ensuing year, he will suggest proposals for bridging the gap, such as modification in freight rates and passenger fares to get more revenue, curbs on spending to reduce ordinary working expenses, and measures designed to gear up railways to the speed age, such as superexpress freight trains, container services, and extra-fast passenger expresses.

The presentation of the Railway Budget is followed by debates in both Houses of Parliament, the Lok Sabha and the Rajya Sabha, and in the light of criticism of his proposals, the Minister may modify these to obtain the final assent of Parliament.

Balance Sheet

The Balance Sheet of the Indian Railways as on 31 March 1985 compared with the previous year is given below :—

(Rs. in crores)

	As on 31 March 1984	As on 31 March 1985	Variation
Block assets	9,401.41	10,377.33	(+) 975.92
Funds with Central Government.			
(i) Reserve funds	579.48	639.27	(+) 59.79
(ii) Banking Accounts	1,486.63	1,631.78	(+) 145.15
Sundry debtors	344.29	355.61	(—) 8.68
Cash in hand	246.75	181.16	(—) 65.59
	12,058.50	13,165.15	(+) 1,106.59
Represented by capital-at-charge	7,567.80	8,285.65	(+) 717.85
Investment financed from internal resources etc.	1,833.61	2,091.86	(+) 258.07
	9,401.41	10,377.33	(+) 975.92

Reserve Funds :

a. Depreciation Reserve Fund	122.10	188.83	(+) 66.73
b. Revenue Reserve Fund	0.47	0.49	(+) 0.02
c. Development Fund	0.71	4.38	(+) 3.67
d. Pension Fund	428.25	432.26	(+) 4.01
e. Accident Compensation, Safety and Passenger amenities Fund	27.95	13.31	(—) 63.64
	579.48	639.27	(+) 59.79

Banking Accounts			
(i) Provident Fund	1,064.31	1,127.45	(+) 63.64
(ii) Miscellaneous deposits etc.	422.32	504.33	(+) 82.01
	1,486.63	1,631.78	(+) 145.01
Sundry creditors etc.	591.04	516.77	(—) 74.27
	12,058,56	13,165.15	(+) 1,106.59

World Bank Loans and Other External Assistance

The Indian Railways have, from time to time, obtained loans from the International Development Association, an affiliate of the World Bank, to cover the foreign exchange cost of diesel and electric locomotives, components of such locomotives and rail-cars, signalling and telecommunication equipments etc.

The Financial Results

The financial results of the working of the Indian Railways for some representative years are given in Annexure 17-B.

Annexure 17-A

Depreciation Reserve Fund

(Figures in lakhs of rupees)

Year	Appropriation of Fund	Withdrawals towards renewals and replacements	Closing Balance
1924-25	10.35	7.29	3.06
1929-30	12.59	11.76	12.24
1934-35	13.72	8.66	9.59
1939-40	12.59	6.53	31.15
1944-45	17.01	8.18	102.21
1949-50	19.17	11.73	109.01
1954-55	30.00	45.82	100.69*
1960-61	45.00	64.04	19.79*
1965-66	85.00	78.91	52.85*
1970-71	100.00	90.68	144.47*
1976-77	135.00	125.22	218.67
1980-81	220.00	278.63	275.59
1984-85	850.00	797.54	188.83
1985-86 (R.E.)	920.00	971.39	154.58
1986-87 (B. E.)	1250.00	1250.00	172.49

*These figures are provisional as the balances of the ex-States Railways merged therein have not yet been finalised.

RE means revised estimates. BE means budget estimates.

Annexure 17-B

Statement showing the percentage of (i) Total Working Expenses to Gross Traffic Receipts, (ii) Net Revenue to Capital-at-Charge and (iii) Net Surplus to Capital-at-Charge of Indian Government Railways

(Figures in lakhs of rupees)

Year	Capital-at-charge	Gross Traffic Receipts	Working expenses (including depreciation provision)	Net Revenue	Net Surplus(+)/ Shortfall(—)	Percentage of		
						Working Expenses Col. (4) to Gross Traffic Receipts Col. (3)	Net Revenue Col. (5) to Capital-at-charge Col. (2)	Net Surplus Shortfall Col. (6) to Capital-at-charge Col. (2)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
51-52	850.11	290,82	224,35	61,75	28,34	77.0	7.3	3.3
52-53	857.38	270,56	218,17	47,18	13,19	80.6	5.5	1.5
53-54	869.30	274,29	231,75	36,92	2,56	84.4	4.2	0.3
54-55	901.58	286,78	236,09	44,06	9,10	82.3	4.9	1.0
55-56	968.98	316,29	258,22	50,34	14,22	81.6	5.2	1.5
56-57	1071,71	347,57	279,27	58,38	20,22	80.3	5.4	1.9
57-58	1222,44	379,78	309,44	57,78	13,38	81.5	4.7	1.1
58-59	1356,59	390,21	321,44	59,32	8,93	82.4	4.4	0.7
59-60	1432,28	422,33	334,62	74,55	20,12	79.2	5.2	1.4
60-61	1520,87	456,80	358,24	87,87	32.01	78.4	5.8	2.1
61-62	1682,98	500,50	390,51	99,75	24,40	78.0	5.9	1.5
62-63	1896,81	566,79	429,52	123,32	42,06	75.8	6.5	2.2
63-64	2159,63	632,21	472,27	145,19	49,24	74,7	6.7	2.3
64-65	2435,12	660,85	528,11	118,11	13,18	79.9	4.9	0.5

(*Contd.*) **Annexure 17-B**

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
65-66	2680,32	733,57	583,04	134,84	18,56	79.5	5.0	0.7
66-67	2841,57	768,78	639, 25	114,12	—18,27	83.2	4.0	—0.6
67-68	2978,03	818,14	639,30	110,00	—31,53	84,7	3.7	—1.1
68-69	3101,27	898,84	741,93	142,81	—7,86	82.5	4.6	—0.3
69-70	3195,51	951,28	790,02	146,56	—9,83	83.0	4.6	—0.3
70-71	3330,78	1006,69	847,34	144,73	—19,84	84.2	4.3	—0.6
71-72	3520,99	1096,59	911,85	169,08	+17,84	83.1	4.8	0.5
72-73	3725,81	1162,42	982,62	164,43	+2,92	84.5	4.4	0.1
73-74	3893,38	1137,89	1066,33	54,41	—115,51	93.7	1.4	—2.9
74-75	4105.56	1408,19	1317,29	73,64	—113,83	93.5	1.8	—2.8
75-76	4354,78	1767.01	1609,62	137,03	—61,11	91.1	3.1	+1.4
76-77	4533,70	2036,11	1718,56	296,29	+87,24	84.4	6.5	+1.9
77-78	4797,12	2123,42	1750,12	352,79	+126,23	83.0	7.4	+2.6
1978-79	5023,92	2151,04	1867,55	260,82	+36,66	87.5	5.2	+0.7
1979-80	5484,64	2337,84	2142,38	227,29	—66,24	91.5	4,1	—1.2
1980-81 (B.E.)	5857,32	2749,59	2415,93	364,95	—42,71	87.7	6.2	+0.7
1980-81 (R.E.)	5934,92	2707,22	2468,61	272,02	—52,34	91.1	4.6	—0.9
1981-82 (B.E.)	6366,92	3276,75	2913,14	399,79	+49,89	88 8	6.8	+0.8
1982-83	7251,09	4376,21	3883,35	554,29	+118,31	88.3	7.6	1.63
1984-85	8285,65	5358,77	5142,17	270,10	—195,59	96.4	3.3	—2.4
1986-87 (B.E.)	10374.10	6819,00	6230,00	659,00	+69,00	91.3	6.4	0.7

+includes also appropriation to Pension Fund from Revenue from 1964-65 and payment to worked lines.

Notes :—(1) Col. (5)—Net Revenue represents the net earning during an accounting period after meeting all the revenue charges except the payment of dividend.

Col. (6)—Net Surplus represents the net earnings during an accounting period after meeting all the revenue charges including the payment of dividend.

18

Rolling Stock

When one thinks of the railways, the first thing which comes to mind is a locomotive. It will, therefore, be appropriate to begin this chapter on rolling stock with a brief history of locomotive building in India. This began in 1865 in Byculla Shops, Bombay of the Great Indian Peninsula Railway, who were first in the field of locomotive building.

The First Locomotives Built in India

True to the old rivalry between the GIP and the BB&CI Railways, the Parel Shops of the latter produced a broad gauge locomotive a few years later in 1873. This was followed by the Madras Railway who built a locomotive in 1876 in their Perampur Works. The Allahabad Shops of the East Indian Railway entered the ranks of loco builders in India in 1882 and the Charbagh Shops in Lucknow followed in 1893. The Jamalpur Workshops, though the first major mechanical shops established in India, joined the ranks of locomotive makers rather late, in 1899. This workshop turned out 214 new or completely rebuilt locomotives between 1885 and 1923, all small tank or tender locomotives for its broad gauge branch line and shunting services.[1]

We may conclude this brief account of locomotive building in India in the early years with a description of the activities on the metre gauge. The Morvi State Railway in Saurashtra were the first builders, in 1891. Four years later in 1895, the Rajputana Malwa Railway started building locomotives in a big way in their Central Workshops at Ajmer. The

RMR administration had an ambitious programme of locomotive building and had completed the first completely indigenous locomotive in 1895 and fifteen locomotives by 1900. By 1911, the Central Workshops in Ajmer had built more than 400 locomotives, many to its own designs, and these included nearly every type of metre gauge locomotive then in service, including the biggest main line machines. The biggest locomotives ever built at Ajmer were 42 YD class 2-8-2s in 1931-34. These weighed 98.5 tons each and cost an average Rs. 75,000.

Imported Locomotives

In the nineteenth century, workshop facilities being limited and the supply of parts from Britain being a slow business, the practice was to despatch spare sets of parts with each locomotive order, on the scale of one set to every five locomotives. Imported locomotives cost about Rs. 29,000 a piece in 1885. Each imported set consisted pretty well of a complete locomotive except for boiler and main frames. In the course of time, replacement boilers were also ordered, and in some cases made in India. As a result there were several instances of using up duplicate parts, and often incorporated portions of old locomotives ; some parts may have been manufactured at the railways' works and others ordered from Britain and elsewhere, and it was often difficult to distinguish between engines "built" and those merely "erected."

The source of the rolling stock, locomotives and workshop equipment from the beginning was England and thus, the structure of the Indian railway system, reflected British practice and tended to perpetuate this dependence upon British suppliers. According to Fritz Lehmann and Hugh Hughes, the few early experiments with other sources of locomotives were mostly failures, as the Indian Railways were built after and were familiar with typical British design features—all-rigid wheelbases in plate frames, inside cylinders and cranked axles, copper fireboxes and boiler tubes among others—and found German and American machines with their very different designs and boilers a nuisance to maintain and expensive to operate. In the 1920s and 1930s some more successful locomotives were imported from America and Europe, but these were either built to British designs or were ordered specially to gain experience with their unusual features. Most railway administrations imported a large number of new locomotives at the same time as some railway workshops in India were turning out good, satisfactory machines.

Owing to the difficulty experienced by the India Office in obtaining reasonably early delivery of locomotives ordered in England for Indian Railways, the Secretary of State requested in 1900 that a General Conference of Locomotive Superintendents of both State and Companies' lines should be summoned for the purpose of the standardization of locomotives of all gauges of Indian railways. The Conference which was held at Calcutta recommended—that the English makers should prepare in collaboration, a series of standard designs to ensure a more rapid rate of delivery and decreased cost—the series to comprise engines of certain mentioned types, the designs being so prepared that, as far as possible, corresponding parts of the various classes be interchangeable.

Standardisation of Designs

In 1903, a few standard designs were evolved under the auspices of the British Engineering Standard Association in collaboration with the British consultants, Rendel, Palmer and Tritton, These BESA designs had provision for standardisation of all main components, with a degree of interchangeability between different types. It was a significant step and resulted in a range of sound and workmanlike designs, which served the Indian Railways for many years. The designs included a range of 4-4-0 and 4-6-0 passenger engines and 0-6-0 and 2-8-0 freight engines and some other variants. Where there was need for greater tractive effort, for instance on the heavy grades of the Thal and Bhore Ghats of the G.I.P., the problem was solved by the use of a series of banking engines carrying their water supplies in huge saddle tanks, which incidently improved adhesion and equalised axle-loading. In the course of time, standard locomotives were improved by the introduction of superheating, piston valves, outside cylinders and Walschaert's valve gear. Many of these served the Indian Railways well beyond the World War II. Results obtained from the general adoption of superheating policy showed that a saving of 15 per cent and 10 per cent in the coal consumption of passenger and goods locos respectively could be effected.

Although the basic motive power for the broad and metre gauge railways achieved a high degree of standardisation at a fairly early stage, there were still ample opportunities for the adoption of non-standard designs for specific duties. In the early years of the twentieth century, several railways adopted the 4-4-2 Atlantic wheel arrangement to meet the higher power requirements for the increased weight and speed of the fast mail trains. Michael Satow and Ray Desmond in their book *Railways of the Raj*

mention "the elegant and successful four-cylinder de Glehn compounds of the Bengal-Nagpur Railway K-class, a design which was in later years, extended with equal success to the M-class 4-6-2 Pacifics."[2]

Import of Complete Locomotives

In 1923, for the first time in the history of Indian Railways, engines were shipped complete to this country from England, and 13 engines arrived at Calcutta for the East Indian Railway on the S. S. "Belgott', and another consignment at Bombay for the Bombay, Baroda and Central India Railway. This era began in 1926 when bids to supply locomotives to a new series of designs were advertised. The main features of the new designs, worked out by the Locomotive Standards Committee of the Railway Board were a new, wider firebox to facilitate better utilization of poorer grades of coal, a trailing truck and new wheel arrangements. The 2-8-2 thus, replaced the 2-8-0 as the heavy goods locomotive. Final details of the new standard designs were produced by the Railway Board's consulting engineers in London, Messrs Rendel, Palmer and Tritton, in collaboration with British locomotive builders. For the broad gauge, the result was a light Mikado with a maximum axle load of 17 tons—class XD—and a heavy Mikado with a 22·5 tons axle load—Class XE. Experience with the sister classes of light, medium and heavy Pacifics (classes XA, XB, XC) was disappointing. The growing conviction that these engines were responsible for a number of serious accidents prompted the Railway Board to take action. The Bihta disaster on the EIR in 1937 was the last straw, but in fact ever since their introduction these engines had worried the civil engineers. There were a number of derailments caused by the instability, described as 'hunting' of the XB and XC engines before the Bihta disaster. Consequently, there followed wide-ranging experiments with other wide firebox designs, purchased in small numbers between the two World Wars.

Imports from North America

World War II caught the Indian Railways short of power and unable once again to get locomotives from the traditional British builders. Emergency orders had, therefore, to be placed with the North American manufacturers for the nearest equivalent of the XD and XE designs. The American and Canadian versions of the XD were the most popular, known respectively as the AWD class and CWD class respectively. About 225 of

the former were supplied to India and about 435 of the latter during World War II and some more were ordered later.

These and other locomotives built for India during the war in North America introduced the design features then current in American and Canadian practice while keeping within the weight and size limitations of the Indian Railways' standards. The locomotives proved popular in operation and the proof of their effectiveness was the repeat orders placed after World War II. These imported locomotives left their impression on the postwar design of new standard classes and the Baldwin Locomotive Works of Philadelphia were given the order for the prototype passenger locomotives 16 WP class 4-6-2s built in 1947. They proved very satisfactory and Indian Railways ordered more WPs, and in 1950, began to receive the first WGs, the freight equivalent of the passenger WP.

WGs not only replaced Garratts on the South Eastern (ex-Bengal Nagpur) Railways' colliery branches, but were frequently seen on passenger services, displacing tank engines, 4-6-Os and even Pacifics. The WGs' ability to start heavy trains and keep them moving with a tractive effort of 38,890 lb at 35 miles per hour had been found just as advantageous in passenger services as in hauling freight. Their modest 18.5 ton axleload gave them a great deal of flexibility. With an explosion of passenger business on the Indian Railways in the post-Independence era, the need arose for hauling trains, with 12 to 16 bogies, instead cf the 10-bogie conventional train and WGs came in handy for such heavier trains.

With the rise of nationalism, a strong demand arose that the Indian economy should reap the fruits of railway development, rather than British concerns and British personnel should continue to do so. War came to the help of the Indian sentiments, as India could not get the normal supplies of manufactured goods from Great Britain and this showed up the weakness of the policy hitherto followed, that is the complete dependence of India on Great Britain for her railway hardware.

Indigenous Production

Hoping that India will be allowed to manufacture its own locomotives, a group of British businessmen incorporated the Peninsular Locomotive Co Ltd. at the end of 1921 with a nominal share capital of Rs 600,000. With Herbert L. Reed, a British locomotive builder, as chairman, the firm started building a factory at a site close to the Tata Iron and Steel Co Works in Jamshedpur, Bihar, intending to procure much of their steel from

its neighbour. The decision of the Government that the demand for locomotives in India was not large enough to justify tariff protection to encourage domestic production resulted in the firm folding up in 1924 without producing a single locomotive ! Government bought the works and used it for making rolling stock components until 1932 when it was closed due to the depression. Proposals began to be made soon afterwards to use these facilities for making locomotive boilers, and by 1944 the Railway Board was negotiating with Tatas for that purpose. These negotiations bore fruit after the war, leading to the creation of the Tata Engineering and Locomotive Co. The Company was never short of orders, for instance in 1951 the Railway Board placed an order of 69 BG and 50 MG boilers for deliveries two years later.

Chittaranjan Locomotive Works

A Railway Board expert committee recommended in 1939 locomotive building in India under government auspices at the Kanchrapura Works of the Bengal and Assam Railway. Planning had to wait till after World War II when some site work actually began at Chandmari, near Kanchrapura, in December 1946. Then Independence and partition into two countries caused re-thinking. The Kanchrapura site, 46 kilometrés north of Calcutta on the Calcutta Sealdah-Dum-Dum-Ranaghat line was thought to be too close to the Pakistan border. This led to the historic decision of December 1947 to build a whole new works at a site in West Bengal at Mihijam. This was later re-named Chittaranjan, in memory of the great nationalist Chittaranjan Dass.

The factory was built in 1950 for the manufacture of 120 steam locomotives annually. The first expansion began in 1957-58 to increase the production of steam locomotives and to add 1000 additional housing units; a second began in 1960 and the Works was further enlarged in 1963 for the purpose of providing a steel foundry with capacity to produce 10,000 tons of castings per year; and yet a third began in 1962 in order to provide new facilities for electric locomotive production.

Foreign Collaboration

To ensure that scarce Indian capital was used to the best advantage, the Indian Railways signed a series of technical assistance agreements with foreign collaborators. The first, a five year agreement made in December 1949 with a British consortium, the Locomotive Manufacturers' Association

of Great Britain, provided for the design of production facilities and the training of Indian engineers and management. When this agreement expired, a five-year technical assistance agreement was signed with North British Locomotive Co. in December 1954. The steel foundry project was carried through with the collaboration of the British steel firm of F. H. Lloyd & Co.

It was with great ceremony that Lal Bahadur Shastri, then Railway Minister and future Prime Minister, came to drive the 100th WG out of the plant on January 6, 1954. It was then a 90 per cent locally manufactured product, including for the first time the main frames, cast in three sections and welded together. As the Indian engineers and technicians gained experience in production and as the factory's different units were completed, there was marked improvement in efficiency and output. Imported components were progressively replaced with indigenous ones, reducing the foreign exchange cost per locomotive from Rs. 250,000 to Rs. 4,000 (about one per cent of the cost of the locomotive). The earliest locomotives took 451,000 man-hours to produce—this was gradually reduced until WG production was stabilized at 54,000 man hours.

The first Chittaranjan WGs actually cost Rs. 747,000 to build, but were sold to the Railway Board at Rs. 535,000 each up to 1957. The rationale for this was that Indian production had to be competitive with the price of imported locomotives, and losses in the early stages should correctly be charged to development, rather than to capital. Thus the Railway Board took a calculated risk that though the investment in the Chittaranjan Locomotive Works represented rather high stakes, once the teething troubles had settled down, Indian production would match that of the established firms in the industrialized West both in quality and cost. It must have been very gratifying to all those concerned with the project to see Chittaranjan's costs come steadily lower. The standard 2-8-2s cost Rs. 605,000 to build in 1951, Rs. 532,000 in 1954, and continued to reduce to Rs. 432,000 by 1964. In that year CLW produced 109 WGs and 44 WPs, bringing the total production since its inception to 1,844 steam locomotives. By the middle and late 1960s Chittaranjan's costs finally fell lower than the best prices offered by foreign competitors.

The Versatile WGs

Though Chittaranjan had turned out 750 WGs up to 1957, so great was the need for locomotives that some 540 more were imported between 1950 and 1956, under the Technical Co-operation Mission and Columbia Plan Aid Programmes. These orders went to builders in Britain,

Germany, Japan, Belgium, Australia, the U.S.A., and Italy, but from 1957 onward Chittaranjan was able to keep pace with the demand, and when WG production was ended in 1970 it had turned out a total of 1908 of these very successful 2-8-2s. According to Fritz Lehmann and Hugh Hughes, the class total of 2450 makes the WG class the largest single class of steam locomotive ever built for any British Commonwealth railway system.

Indian Railways in settling for the WG as the standard freight locomotives of the post-Independence era chose to develop a lighter locomotive than the heavier XE and AWE classes, which had not always faired well. Moreover, track renewals and repairs were in arrears, inadequate traffic capacity was creating bottlenecks, retarding economic development and capital was scarce. The WG in large numbers was ideal for moving trains rapidly on existing track, but it fell behind traffic needs and line capacity. By the middle 1960s Indian Railways management were forced to the conclusion that such moderate-sized steam power could not handle any more traffic on certain busy saturated trunk routes. To meet the requirements of pulling heavier trains, without any substantial addition to the axle loads, Indian Railways had to turn to diesel and electric traction. More on that in a later chapter on Modernization.

Diversification at Chittaranjan

Electric plant and machinery were expensive and so were diesels which were obviously not going to be available in sufficient numbers for most services for the years to come. So Chittaranjan diversified its steam production even while it was beginning to build electrics. With RDSO's design, Chittaranjan produced a 100 per cent Indian WT 2-8-4T, the first 10 of which were built in 1959-60 as IR 14000-14009, 14000 was named "Chittaranjan." These locomotives used a Belpaire boiler typical of older Indian usage with cylinders and drive wheels identical to the Wp class 4-6-2. Their 118-ton overall weight kept them within a 17-ton axle load, but their 30,600 lbs tractive effort enabled them to handle 12-car trains in suburban service, instead of the 4, 5 or 8 cars of the older classes. Another twenty were built in 1965-67, IR 14010-14029, for use on the suburban services around Madras Central.

CLW Produces Passenger Locos

In the late 1950s, Chittaranjan turned its attention to the needs of passenger services. The WP class 4-6-2 which had inaugurated the new

standard designs had been largely imported, but Chittaranjan began production of this handsome bullet-nosed locomotives as well. In February 1963 "Vivekananda" the first of the 259 WPs, was turned out of the Chittaranjan Works. Indian Railways had also imported 10 light class WL Pacifics from Vulcan Foundry of England in 1955 for branch line service and in 1966-68 Chittaranjan followed this up as well with 94 WL 4-6-2's, IR 15014-15107. These have the 5 ft 7 in drivers of the WP class but the 17-ton axle load of the WT, with 153.6 tons overall weight, thus, combining some advantageous features.

End of Steam Production

The commissioning of Chittaranjan's last WG, the last broad gauge steam locomotive, IR 10560, was an historic occasion. Over the years the ceremonial occasions of naming new locomotives at the works had mostly drawn on names from Indian history or of heroes of the Independence movement, but 10560 was an exception. In June 1970 she was named "Antim Sitara" (the Last Star). Steam production did not end however, but continued for another nineteen months as the works completed its final order for a batch of 60 metre gauge YG 2-8-2s. This order was originally planned for 100 units and for the private builders, Tata Engineering and Locomotive Co. (TELCO) of Jamshedpur, Bihar. Telco built 604 YGs from 1952 to 1966. No ceremony was held for IR 3573, the last of the Chittaranjan-built steam locomotives, a YG, an outsider. This last steam locomotive built in India left the plant nameless on February 5, 1972, for the North Eastern Railway's Varanasi Loco shed. That marked the end of the steam locomotive building in India.

Steam operation did not cease with the Railway Board's decision in favour of dieselization and electrification and Indian Railways had planned even in the 1960s to continue using its steam fleet (9700 locomotives in 1971, against 1091 diesels and 552 electrics) to the end of their economically useful life, which could mean the end of this century.

Passenger Carriages

Railway carriages were manufactured in India almost as soon as the first trains were introduced. Ironwork for both carriages and wagons was shipped from England, and the bodywork was built with local woods, especially Burmese teak. In 1959, the Board of Directors of the Calcutta and South East Railway authorised their Agent to accept the tenders of a firm

for the construction of railway carriages in India at the following rates : 1st class Rs 2520; 2nd class Rs. 2000; 3rd class carriages, and goods trucks to be constructed by the Railway's own engineers.

The Earliest Third Class Coaches

The earliest third class coaches introduced in India were designed on the same pattern as the contemporary third class carriages on British Railways. The first carriages were rectangular rough wooden open boxes affixed to wheels with benches laid horizontally for seating passengers. Passengers sat exposed to the sun, to the wintry breeze, rain and snow storms. They also received very unpleasant jolts whenever the brakes were applied, or when the engine accelerated as the coaches would either run into one another or fly apart. In India. passenger vehicles had truck bodies and outward opening doors. The seats had backs and were placed longitudinally. For several years goods wagons and even open trucks were used as substitutes for the transport of passengers, whenever standard stock was not available.

While on British Railways passengers had to bring their own candles, provision was made for oil lamps in Indian coaches. Drawings of roof lamps and reflectors in use on certain lines figure in the Proceedings of the Railway Department in 1880, but they had not been universally adopted. As a measure of safety, the vacuum brake had been introduced a year earlier.

Two-tier Coaches

Experiments with two tier coaches were made in 1865 in Bengal to carry the maximum number of passengers in limited accommodation. The double-tier third class coaches had a carrying capacity of 120 passengers of which 70 were carried in the lower tier and 50 in the upper. The Eastern Bengal Railway reported "the Natives prefer the double-tier carriages to the ordinary fourth-class carriage without seats in use on this railway......" On the East Indian Railway, "experiments were made by placing the same amount of double-tier and ordinary fourth class accommodation on a train, and the results proved that, for every 100 passengers who selected to travel in the ordinary fourth class carriages without seats, only sixteen travelled in the double-tier carriages with seats. This is most conclusive proof that the fourth class carriages at present in use on the railway are much more liked than the double tier carriages......" Other reasons given

against the use of such carriages by EIR were slowing down of trains due to extra time that was required for boarding and alighting and likelihood of larger casualties in the event of accidents.

A Fourth Class Coach

A fourth class coach was introduced in which the seating boards had been removed, and the passengers had to squat on the floor. There was already considerable overcrowding in third class carriages, but in these fourth class carriages passengers had to travel huddled together, sometimes in terrible heat. This led to a furore of public agitation till finally in 1885 benches were restored, but the system of having four classes continued. The third class was named 'Intermediate' and the fourth class continued to be called the third class.

The original third class coach was a four-wheeled unit constructed on wooden underframes. It had a normal carrying capacity for 70 passengers. The wheel base of these carriages was twelve feet, and axle load as low as eight tons. Axle boxes were of cast iron, with a loose brass insert for the bearing. Laminated springs were used to absorb road shocks. The buffers were of wrought iron bolted to the wooden headstocks. Double-tier coaches were gradually discarded and the seating capacity of ordinary coaches was considerably increased. The standard coaches were in due course enlarged to accommodate 93 passengers. They continued to have timber bodies on timber underframes, reinforced with steel knees and gussets.

Coach builders in Europe had in the meantime developed an all-steel underframe on which was mounted a wooden coach body. Experience in India indicated that timber underframes were susceptible to deterioration in service and necessitated expensive repairs. The all-steel underframe as developed in Europe with wooden coach bodies was introduced in India in 1885. At the same time considerable improvements were made in the design of the body. The construction in wood of passenger bodies, however, continued to be the common feature not only of third class carriages, but also of upper class carriages till the middle of the twentieth century.

Bogie Coaches

In the first decade of the twentieth century, four-wheeler passenger coaches began to be replaced by bogie coaches of 56 feet 10 inches by 9 feet dimensions. In 1903, the first bogie dining saloon was placed on the

line. From 1909 outward opening doors were gradually replaced by inward opening doors. Some outward opening doors were, however, still to be seen, particularly on the metre gauge, right till the sixties.

Replacement of oil lamps by electric lights in passenger carriages commenced in 1920, when the Railway Board instructed the Government railways, North Western, Oudh and Rohilkhand and Eastern Bengal that "all passenger vehicles including third class carriages on main and branch lines services are to be fitted with electric lights." A copy of these instructions was sent to all company railways numbering about twenty, who could not be directly ordered by the Board to provide electric lights, but were expected to fall in line. On the average, only half of the Indian Railways' passenger stock was fitted with continuous brake, or piped. About 1900, only some lines still provided alarm chains; the other railways had decided, perhaps erroneously, that they were i neffectual.

All Steel Coaches

In 1922, 'all steel multiple coaches' were imported from England for the electric suburban trains in Bombay area. In 1927, 250 such coaches were procured for service on the East Indian and North Western Railways. About 1940, a small number of all-steel broad-gauge coaches were built in some railway workshops in India. It was not, however, till 1949 that the Railway Board adopted as a future standard the all steel design which offered a far greater measure of safety to the travelling public compared with the timber body coaches. Soon after, an order for 100 coaches was placed with the Hindustan Aircraft Limited, Bangalore and this factory has since been regularly producing all-steel broad-gauge coaches for Indian Railways.

Simultaneously with the decision to build all-steel coach bodies, the Railway Board also accepted what has now come to be known as the 'integral design' in which the underframe and the body are one unit. The new coaches were longer and wider, affording greater space to passengers. The third-class variant of this seated 80 passengers and had 6 lavatories. Seats were back-to-back, wooden, with four seats on one side of a gangway. Two of the lavatories were central, thus dividing the car into two equal compartment. When one of the compartments was intended for ladies only, it was fitted with window bars and internal security catches.

On the metre gauge, the general layout was similar. The third-class coach was divided by solid partition into two sections, each section seating 34 passengers on four-abreast plywood seats. The aisle gangway was along one side with five-abreast seating provided at each end.

Hitherto the limit for broad gauge bogie coaches had been 68 feet by 10 feet. These dimensions were increased to 70 feet and 11 feet 8 inches respectively. It was however, soon realised that the width of 11 feet 8 inches was unsuitable for the existing track, and its adoption as standard would result in much avoidable expenditure. The design was, therefore, appropriately altered.

Swiss built coaches constructed at Schlieren, Zurich and imported during the decade following Independence to serve as a standard design for carriages, represented a revolutionary advance in comfort, safety and smoothness in travel. These were of all welded steel fabrication, of a light weight design, employing a floating bolster support of longitudinally placed laminated springs linked to the bogie-frame. The bearing springs were of helical type working in combination with hydraulic dash pots and rubber pads arranged on roller bearing axleboxes. The strength inherent in the integrally constructed coaches rendered them practically immune to the hazzard of telescoping and wrecking of bodies, in the event of serious accident. The springing arrangement ensured smooth riding of the carriage during varying speeds making travelling much more comfortable.

Upper Class Coaches

In India the basic construction of upper class coaches has followed closely the third class pattern. In fact, the same bogie is in many cases divided into compartments of various classes. In 1863, the first luxury saloon, a four wheeler carriage was built for the Governor of Bombay in the Bombay, Baroda and Central India Railway workshops at Amroli. The coach height was elevated and within the somewhat cramped confines of a four-wheeler coach, a sitting-cum-bed room was arranged in one half of the coach, while the opposite half served as the dining room. The lower floor deck of the coach provided accommodation for servants. Early first class compartments generally had one to two bunks : the upper bunk when provided was collapsible and could be hooked back when not in use.

The first class coach provided one six-berth, two coupes and three four-berth compartments, a total of 22 berths. As there was no corridor they occupied the full width of the vehicle and each compartment had its own shower and lavatory. The lower berths could be raised to form back-rests, and the upper berths folded back. Seats were available by day for 33 passengers.

The inter class was never much better than the third, except that in earlier years wooden benches were padded and were covered with canvas

or hessian. The second class was a distinct improvement on the intermediate, in the sense that it had all along been a near approach to the first class in respect of lighting, number of windows and shutters, sanitary provisions, seating and cushions.

Air-Conditioned Coaches

A crude but effective system of keeping temperatures down in railway carriages during the hot weather existed as early as the eighteen sixties on the Indian Railways. Describing this arrangement, M. Louis Rousselet wrote, "Travellers proceeding from Bombay to Calcutta by the express trains now are accommodated with carriages with khas khas in mattings which are kept moist by reservoirs specially provided for the purpose. This moisture, enveloping the carriges, preserves the temperature at a degree of coolness sufficient almost to extinguish the risk of incurring sun stroke or apoplexy, at one time so frequent on these journeys.' On some routes khas khas was not available, but ice-containers and large tubs filled with blocks of ice were provided for a normal payment, these with the fans playing full blast and venetian shutters down, lowered the temperature inside a compartment by about ten degrees. This was way behind a modern air-conditioned coach on the Indian Railways which is dust-proof, has an attached toilet and bathroom and is richly and elegantly furnished.

Air-conditioned coaches were first introduced in India in 1936. It was to the credit of engineers of the Indian Railways that the first air-conditioned coaches employing the electro-mechanical air-conditioning system were constructed in the G I P Workshops at Matunga, near Bombay. Since 1950 several new air-conditioned coaches have been built in Indian Railways workshops, which are in many ways a considerable improvements on the earlier coaches.

Electric Train Coaches

Carriages on the suburban electric trains had the advantage of more advanced designs since suburban electric trains started running only in 1926. From their very inception suburban lines introduced all-steel electric multiple unit bogie coaches with seats conveniently arranged to permit easy entry and exit to passengers. The carriages which have been placed in service in recent years are as modern in construction and design as are to be seen any where in the world. The new stock is of all-steel light weight construction

with comfortably arranged seats. Ample provision has been made for revolving fans and the compartments are lit with flourescent lights.

Freight Wagons

In the fifties of the nineteenth century, as the first railways were opened to traffic, ironwork for wagons was supplied from England and the body was made from local woods. The four-wheeled covered wagon was the general purpose freight vehicle, often used for carrying goods for which an open wagon or a hopper would have been more suitable. The maximum load carried by the earliest wagons was 12 tons.

A new type of wagon employing structural rolled steel sections and plates came to be adopted as standard from 1908 onwards in India. India was one of the first countries to appreciate the advantages of standardisation and introduced standard designs for all-steel wagons of various types over its entire railway system. These designs were first prepared by the standard wagon sub-committee of the Indian Railways Conference Association in 1922. Standardisation made possible economy in stocking of spares and maintenance. Some of these wagons were designed with flap doors and some with dropping ends. Covered wagons were evolved with vertical hinged doors, in some cases with dropping flap section to meet the need for the transport of cattle.

In the nineteen-twenties wagons were being manufactured in India as well as ordered on Canadian firms. Some American wagons were also in use on Indian Railways. Indian manufacturers were Burn & Company, Jessop and Company and Indian Standard Wagon Company.

Different Types

Several alterations were required in the basic design to enable the transport of commodities ranging from coal to sand, from heavy timber logs to sugar-cane, from mineral ore to rubble, and as various as elephants. tigers, rabbits, cattle, poultry, petrol, water, oils, chemicals, cloth, and food-grains. This naturally led to the development of different types such as wagons for coal, coke or timber, oil, petrol, and water tanks, travelling cranes and gas holders, ballast wagons, wagons for explosives and ammunition, and wagons for conveying automobiles, and for transporting general merchandise. While the four-wheeler continued to be the more popular basic type, the bogie wagon was introduced in later years to meet special requirements, and also to enable bigger freight loads to be hauled.

To give an idea of the manner in which the basic four-wheeler and the bogie were adapted to meet the requirements of different kinds of freight, some of the types of wagons in use deserve description. Cattle wagons were divided into pens and were provided with ventilators so as to induce a lively circulation of air to afford comfort to the cattle. Special provision was made for the drainage of waste matter. Troughs were provided for feeding and drinking. The timber truck was an open truck with a skeleton body, designed to carry various sizes of timber. The hopper type of wagon was for carrying ballast, minerals and coal. Powder vans had a heavy timber lining with a thick insulation to check transmission of heat. The metallic fittings such as hinges, clips and brackets used inside the vans were made of gun metal to avoid risk of sparking by contact with explosives.

Cold Storage Transit

The carriage of perishable commodities in cold storage by rail received the attention of the Indian Railways early in the twentieth century. Bogie refrigerated vans had a double-case timber body insulated with slab cork. Cam-operated spring sealed doors were provided to ensure an airtight interior. The flooring was of a special cement compound laid on a timber boarded surface insulated with cork. In the middle of the van an ice bunk was provided for carrying blocks of ice and blower fans were placed at ceiling level to blow air over the ice blocks from vents along the sides of the van.

Oil tank wagons had a cylindrical steel tank designed to carry oils of many varieties. Petrol tank wagons were equipped with pressure release safety valves, vapour return valves, and a sealing door in the manhole to prevent the loss of petrol vapour. The wagons were finished with aluminium or white paint to minimise absorption of atmospheric heat.

The Well Wagon

The well wagon was designed for the transport of bulky articles which might otherwise infringe the maximum moving dimensions due to excessive height. The giant type constructed soon after Independence could carry a load of 130 tons well distributed over its length. As a type in wagon construction it was outstanding, if not in the world, at least in Europe and Asia. These wagons were built by a Swiss firm, but the design. particulars and specification were prepared by the Central Standards Office of the Ministry of Railways in India. The all-welded

construction was used in order to reduce the tare weight to the minimum. The giant wagon was 90 feet 5 inches (27.59 metres) in length over the buffers and 56 feet 7 inches (17.25 metres) between the main pivots. This type of well-wagon, which owed its design to the enterprise and resourcefulness of engineers of the Indian Railways proved to be of immense help in the transport of heavy mechanical equipment, for the rapid completion of such great national enterprises as the Damodar Valley project, the Bhakra Nangal project and the Hirakund Dam.

A distinct improvement in terms of reduced tare weight was made possible in the recent experimental designs of four-wheeled covered and open wagons with aluminium bodies. These were put in service on the Western, Eastern, Southern and Central Railways in 1951.

High Capacity Bogie Wagons

The Indian Railways' wagon fleet of 405,185 in 1980 consisted of many diverse types by way of size, construction, carrying capacity, speed capability and functional role. Until the middle of the century practically all goods traffic was carried in general purpose wagons—the covered, open, high-sided, and open low-sided wagons. The standard wagon on broad gauge had been evolved as a 10.31-tonne tare four-wheeler with maximum loading capacity of 22.19 tonnes. On the metre gauge it was the 5.69 tonne tare wagon with 18.69-tonne carrying capacity. In recent years a number of new bogie wagons, with emphasis on higher payload, 55 tonnes, and fitted with gadgets to facilitate loading and unloading special types of traffic, have been put into service.

BOBS (side discharge wagons) were introduced in 1957-58. BOX (open high capacity) in 1959-60, BCX (bogie covered) in 1963-64, BOBX (composite side-cum-centre discharge) in 1966-67, BOY (90-tonne open) in 1973-74 and CRT (covered) four-wheeler high capacity in 1974-75. The important bulk traffic, which is more than half the payload of the freight business, is being carried in new high-capacity bogie wagons, even though the four-wheeler wagons still remain the most numerous. Lack of interchangeability between the two types has caused two kinds of problems; first, one type may be under pressure while the other is underutilised, thus, vitiating the ratio between the number held and that actually in use; and second, some traffic suitable exclusively for one type may remain unmoved, which has been the case.

Increase in the carrying capacity of wagons has been a concern of railway wagon manufacturers all over the world. The average capacity

of a wagon has progressively increased in a bid to absorb, as far as possible, the growth in traffic without increasing the line capacity which is both costly and time consuming. The annual gain in average carrying capacity of the Indian fleet, an unbroken trend since 1955-56, has been possible mainly by the introduction of new high-capacity bogie wagons. The aggregate capacity of today's wagon fleet is 165 per cent more in comparison with 1950-51, while the number of wagons has increased by less than 100 per cent.

On the MG also, bogie vehicles have gradually replaced four-wheelers. Though the narrow gauge lines owned a larger proportion of bogie wagons as compared to BG and MG, they have also maximised their capacity with new bogie vehicles.

Absence of privately owned wagons, combined with high demurrage charges have enabled Indian Railways to obtain high wagon utilisation as compared with railways elsewhere. Although high utilisation speaks of efficiency, it has also meant dissatisfaction when consignors are not able to get empties of their choice promptly. One of the important measures taken by the Indian Railways to improve wagon availability to the customers was pooling of wagons. Broad gauge wagons were pooled by the several railways in 1919. There were till recently separate Southern and Northern metre gauge wagon pools, but eventually these were also combined into a common pool.

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19

Railway Stores and Infrastructure

The purchase of stores and materials for the Indian railways had to be considered as soon as the first lines were laid in 1859. The Court of Directors of the East India Company directed the Governor General-in-Council that "a great proportion of the stores in use might be anticipated and provided for by order from this country (England) and that Indian Stores in ordinary use should be provided by periodical contracts on tenders called for by advertisement." In pursuance of this policy the total expenditure on State Railway Stores and rolling stock purchased in England in 1885 was £ 1,895,778, while the amount spent on these items in India was Rs. 40,00,830 only.

Early Purchases in England

The storekeepers of the Company railways (later they were given the exalted name of Controllers of Stores) were instructed by their Home Boards to import as much as possible from England. But as the Government of India acquired some railway mileage, there was a shift in the policy. In the first quarter of the nineteenth century, the supplies required by the Indian Railways were divided into : stores of indigenous origin which were purchased in the country; imported stores procurable in India; and stores procured direct from abroad. Purchases of indigenous stores were arranged for by each railway administration except that in the case of large items such as sleepers, coal and rails, the Railway Board negotiated the purchases for the three State-worked lines together, namely, the North Western, Eastern Bengal and Oudh and Rohilkhand Railways. As a

matter of principle everything procurable in the country was utilised in preference to articles of foreign manufacture. The Stores Purchase Committee which considered this matter in 1920 made various proposals for extending and facilitating such purchases. The question of extension of this form of supply was dependent to a great extent on the organisation of Indian industries.

During a five-year period from 1915 to 1920, the value of total purchases grew from Rs 6.74 crores to 30.25 crores. The value of stores imported direct fell off during the worst of the war years to Rs. 1.34 crores and increased in 1920-21 to the large figure of Rs 16.23 crores or nearly four times the figure of 1915-16. In the same period imported stores purchased in India increased about five times and local purchases over six times. On the surface it may appear that the principle of increasing local purchases at the expense of imported material was hardly effective in practice. To get to the facts of the position a further analysis was made. The figures given excluded in the first place coal, stone, bricks, lime and other materials which had been invariably purchased in India and charged direct to work in which used. The large figure of imported materials included bridge work, engineers plant and workshop machinery and tools, rolling stock, electrical plant, permanent-way and metals.

Of these the first four were practically unobtainable in India in the first quarter of the nineteenth century. Bridge work, wagons and carriage underframes were to a small extent turned out in Indian shops, but they were still dependent on supplies from abroad for many essentials.

Locomotives, tools and electric plant which were not procurable at all in India made up the greater part of the foreign purchases. The purchase of rails in India rose from Rs 13.91 lakhs in 1915-16 to Rs 62.46 lakhs in 1920-21. Iron and steel were purchased in India to the extent of Rs. 59.20 lakhs in 1920-21 against Rs. 12.87 lakhs in 1915-16 as a direct result of the enterprise of Messrs Tata and Sons.

Change of Policy

The quantity and value of stores purchased in India gradually increased while that of imported stores decreased. This process of increasing the quantity of stores and materials manufactured in India or of indigenous origin continued uninterrupted right till 1947-48 and in that year such stores formed 91 per cent of the total purchased by Indian Railways. There was however a reversal of this trend after Independence when India entered the

era of planning and there was need for a rapid expansion of the railway infrastructure.

At the beginning of the era of planned development in 1950-51, Indian Railways were importing about 23 per cent of their equipment and stores and this figure jumped to 26 per cent in 1955-56. Since then, such imports have been progressively reduced to 5.7 per cent in 1984-85.

Indigenous Development

Purchases of stores of indigenous origin went up by Rs. 171.31 crores from Rs. 1885.88 crores in 1983-84 to Rs. 2057.19 crores in 1984-85. The indigenous component represented 94.3 per cent of the total purchase bill. The import content of materials used by the Railways has been steadily coming down but there is still a residual need for import of certain essential raw materials, proprietory items, diesel and electric loco components and other rolling stock parts and fittings. The import content has come down from 8.2 per cent in 1983-84 to 5.7 per cent in 1984-85.

The Track

The common impression that the track, consisting of two parallel lines of rails, laid on the ground, originated with the railways driven by the steam engine, is incorrect. Rails had been in use for about a hundred years before the invention of the steam engine. They were not made of metal, but of wood, and served as wagon-ways on which wheeled vehicles could be moved with ease.

It was in 1787, according to available records, that wooden rails started being replaced by cast iron ones. Iron-flanged rails were introduced in England at the collieries in Sheffield. From the beginning of the 19th century, these 'Railways' for trucks and trams drawn by horses were a common sight in various parts of England and some parts of Europe.

In 1803, Richard Trevithick discovered that tracks could be propelled more easily 'by the adhesion of a smooth wheel to a smooth rail.' This perhaps more than anything else, paved the way to the use of the moving steam engine, pulling a number of coaches or wagons. The fact that a large number of coaches pulled by a locomotive move smoothly and safely at a rapid speed appears something easy, natural and commonplace to people today. But to the first pioneers, even after the principles of moving wheels on rails and of the propelling power of steam had become known,

the building of a track, capable of bearing the pressure of heavy fast moving trains, the construction of rails, the determining of the distance at which they should be affixed parallel to each other, and the manner of fixing them to ensure firmness and stability, presented some very difficult and complicated problems. These problems have continued to be the subject of research till today. In fact, in the early stages it was difficult to convince people that a fast moving railway train would continue on its tracks and was not likely to run off the rails and become a danger to the life and property of those living in the neighbourhood of the railway line. So widespread was the fear, that some of the English counties actually made representations against railway tracks being built through their territories. To obviate some of the dangers of trains going off the tracks, various alternative inventions were tried which in the light of the experience of the past two hundred years will seem amusing.

In England, more than one inventor experimented with what was then known as the 'atmospheric system.' This was based on the "general principle that trains should be propelled forward by means of atmospheric pressure acting on a piston working in a tube from which the air had been pumped by stationary engines situated at intervals along the line of route." The system was not a passing fancy. It was actually tried at many places, for instance on the London and Croydon Railway in 1846 and on the steeply graded South Devon Railway in the following year. At the latter location, it was tried by I. K. Brunel who distinguished himself as a railway engineer and ship-builder. One of his jobs in India was Consulting Engineer to EBR in 1855.

During the eighteen forties when various schemes for developing railways in India were being discussed, a book written by a Colonel Grant of the Bombay Engineers attracted great attention. In view of "high mountains, impassable rivers, thick forests and jungles, and herds of cattle and other animals found moving about all over the country, he felt that the idea of laying the permanent way of railways on the surface of the ground was utterly inapplicable under the conditions and circumstances of India." He recommended that every Indian railway should be suspended throughout its entire length by regular series of suspension chains, at a minimum height of eight feet above the ground, which he considered would be ample to place it beyond the reach of animals and to find fairly uniform alignment. Costly models of this extraordinary system of railways were even prepared and exhibited. Several other schemes of an equally ingenious and erratic character were advocated and rejected before the existing system, whereby parallel iron rails are laid over a specially prepared track of ballast and

fastened to sleepers either of timber or iron to hold the rails in position, was adopted.

Iron Rails

The first rails imported from England were manufactured from iron and were extensively in use on the Indian railways for a quarter of a century. There were frequent failures so that in 1876, G. L. Molesworth, Consulting Engineer to the Government of India for State Railways, along with Mr Rendel of Rendel Palmer & Co of London reported that "they were thoroughly convinced that the deterioration in manufacture of iron rails in England was such that no reliance could be placed on them, and that no precautions of inspection could secure sound iron rails ; we therefore recommend the adoption of steel in preference to iron in all future orders of rails."

The first track laid on the Great Indian Peninsula Railway consisted of 65 lb wrought-iron double headed rails, laid on stone sleepers. Soon after both bullheaded and flatbottom rails were in use in India. It was not the practice to use light rails on the broad gauge ; where it was necessary to save money, the narrower gauges were adopted and the track was laid at lower standards. Thus when the metre gauge was adopted, 40 to rail was fixed as the standard, although 30lb was used on some lines with light traffic. As traffic developed on metre gauge lines, light rails were replaced with heavier ones. For instance the Rajputana-Malwa Railway was relaid with 50 lb rails.

Heavier Steel Rails

By 1918 flat-footed steel rails of 85 lb or 90 lb were regarded as the standard for broad gauge trunk routes. On the metre gauge in 1918, 60 lb rails were in use on busy sections and were gradually replacing lighter rails of 41¼ lb and 50 lb on other sections. Welding of rails, three to five rails together, was introduced in the 1960s. Apart from eliminating joints and making riding more comfortable, rail welding also made remova of rails harder for saboteurs. The production of rails and fishplates during 1950-51 by the two Indian firms, viz. Messrs. Tata Iron and Steel Co. and the Steel Corporation of Bengal taken together, amounted to 57.160 tons, which was found adequate to meet the railways' requirements making it unnecessary to have recourse to imports.

In line with the increase in traffic and train speeds, the track structure was gradually upgraded by using heavier rails in place of the lighter sections. In the early 1970s, the standards of track on the Indian Railways were :

	Kgs per metre	
	B.G.	*M.G.*
On trunk routes	52	37.13
On other main lines and branch lines	44.61	29.76

By 1973-74, 11,228 route kms (37.2 per cent) of broad gauge track had been laid with 52 kg or heavier rails and 2769 route kms (10.8 per cent) of metre gauge track had been laid with 37.13 kg rails. The average weight of rails used had gone up from 45.19 kg to 45.67 kg per metre on B.G. and from 28.68 to 29.45 kg per metre on M.G.) during the Fourth Plan (1969-74).

Currently, on the broad gauge, 60 kg and 52 kg per metre rails are being used on high speed and heavy density routes. On the important metre gauge routes, 44.64/37.20 kg per metre rails are being used. In order to further increase riding comfort for passengers and to reduce the cost of maintenance, rails are being welded together into long lengths of one km or more.

Timber and Iron Sleepers

In India, sleepers are placed at a certain distance apart at right angles to the rails. In some other countries they are placed longitudinally in a continuous line under the rails. Longitudinal sleepers are still considered safe and economical on lines of wide gauge as in some parts of Russia. According to some experts 'rails laid on them make a very easy and smooth road.' The arrangement has been rejected as impracticable in most countries. In India, both timber sleepers and cast iron bowls, or as they are called 'pot' sleepers, have been freely in use. Wooden sleepers provided excellent cover for white ants who built earth galleries under them and these disintegrated when a train passed. The life of wooden sleepers was short, ten years on the average; but in the dry sandy areas such as Rajasthan, they lasted much longer, sometimes twenty years. In the course of time, the use of cast iron and steel sleepers increased and the number of wooden sleepers in the track decreased mainly due to scarcity of good wood. This

was particularly so on the broad gauge, while on the metre gauge nearly three-fourth of the sleepers were of wood.

The relative proportion of various kinds of sleepers used may be seen from the following percentages based on the total number of sleepers in the tracks of Class I Railways in 1947 :

	Wood	*Cast iron*	*Steel*
Broad gauge	28	50	22
Metre gauge	70	5	25

The supply of wooden sleepers continued to pose serious difficulties after partition. The Railway Accidents Committee 1962 observed: "It has to be appreciated that the supply of all kinds of sleepers including the wooden sleepers has to be adequate not only for the present standards of track with densities ranging from N to N+3 but also to meet the future requirements of the increased density of N+6. Wooden sleepers are widely used on the railways but their supply has been unsatisfactory in the past. For instance, in 1961-62, 80 lakhs of sleepers were supplied against the demand of 111 lakhs resulting in a shortfall of 28 per cent. In 1962-63, the Railways received only 71 lakh sleepers against the demand of 109 lakh sleepers, the shortfall in supply being 35 per cent. The regular shortages of wooden, steel and cast iron sleepers make it incumbent on the Railways to go in for an extensive use of pre-stressed concrete sleepers."

Concrete Sleepers

Concrete sleepers were first tried on the Indian Railways as early as 1918-19, in view of the fact that the demand for faster trains and heavier density of traffic made the introduction of track-circuiting desirable for ensuring a higher standard of safety in station yards, on the trunk routes and on busy suburban sections. The Research Design and Standards Organisation evolved several designs of concrete sleepers for use in yards and on the running lines. Trials were carried out from time to time with sleepers designed for running lines but till 1962 none of them had proved entirely satisfactory from the technical and economic points of view. In recent years, prestressed reinforced concrete sleepers with improved elastic rail-to-sleeper fastenings have been used at an increasing rate, but have been confined to high density and high speed routes, totalling 2,442 kilometres, as on 31 March 1985.

Bridges

In Chapters 2 and 3 of this book, we have described in detail the construction of some major bridges, notably those over the Son near Arrah opened in 1863, and over the Jamuna at Allahabad and Delhi opened in 1865 and 1866 respectively. Another bridge on the Son, called the Upper Son Bridge, with 93 spans of 105 feet each, was built in 1900 near Dehri-on-Son, with a length of 10,052 feet, (3116.12 metres). It is the longest railway bridge in India and the fourth longest in the world. These were pioneering efforts, which were acknowledged as great engineering feats of the nineteenth century. The Arrah bridge has also found a permanent place in history for another reason, completely divorced from engineering. Men building this bridge provided the defences for the works when they were attacked during the political upheaval of 1857. The Sutlej bridge, as noted in Chapter 3, was another important bridge built in the north in the nineteenth century. It was opened in 1870 and was 5,133 feet (1591.23 metres) long.

The Ganga

Also in the nineteenth century was opened the first large bridge over the Ganga near Varanasi. This was the Dufferin bridge, later renamed Malviya Bridge. It was officially opened in 1887 by Lord Dufferin during whose viceroyalty the entire construction took place. A great deal of research and study were required before the engineers could determine the total length of the bridge waterway, the size of individual spans, the type and size of piers and the necessary depth of foundations, the design and the character of the superstructure, whether the bridge could be used both for railway and vehicular traffic, and the most economical and expeditious methods for its constructions. In consideration of the limits of scour and high floods it was deemed necessary that the foundation caissons should be sunk in pure sand to a minimum depth of 120 feet below low water level, that is to 83 feet below the ordinary dry season bed in its deepest part. The larger girders were of the compound triangular type, 355 feet 6 inches in length and 35 feet $4\frac{1}{2}$ inches in depth. The smaller girders 113 feet 8 inches in length by 11 feet $5\frac{1}{4}$ inches in depth were used, so that both rail and cart traffic could be carried on the same level between the large girders, and over the top of the smaller extension spans. After several alterations had been considered for getting the huge main span of girders worked into position, such as floating them into place by the aid of pontoons, or raising them very near the water-level by hydraulic lifts, the girders

were finally placed by very cleverly arranged stagings of full height, erected on the river-bed between the piers.

Out of the various junctions for the interchange of traffic between the Eastern and the North Eastern Railways, Mokamehghat was by far the most important. There was a wagon ferry here, the replacement of which by a bridge over the Ganga had been under consideration since the beginning of the twentieth century. In 1952, Sir M. Visveswaraya, a distinguished engineer, was approached to go into the question of finding an appropriate site for the proposed bridge. According to his advice, Mokameh was selected for the construction of a bridge that would provide a rail link between South and North Bihar.

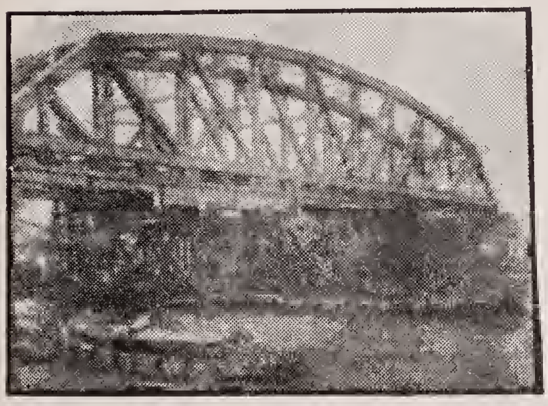
An interesting and challenging feature of the training works for this bridge was the blocking of one of the two channels, north and south, through which the river flowed. The method adopted for the closure of one of the channels was to build stone dykes along with toes and to fill in earth between them to a height of 10 feet above the low water level in the first stage. For the final closure, three rows of sal ballies 25 feet long were driven across the channel. At either end of these rows of ballies a molehead of stone and sand bags was built. Finally, the space between the rows of sal ballies was filled with sand bags in a non-stop effort round the clock, thus obtaining the closure of the channel.

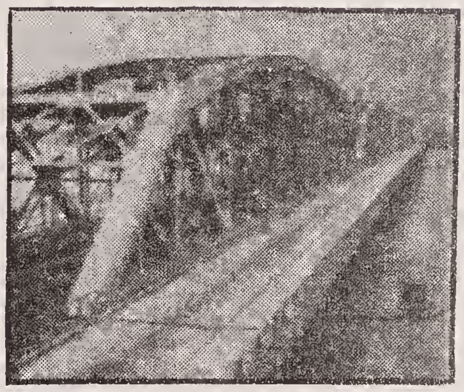
The novel feature of the design of the bridge was the extensive use of welding in the construction of all the floor members for the railway, the roadway and the footpaths. There was no known engineering precedent of so liberal a use of welding in an important structure like a bridge of the size, 6,180 feet long, consisting of 14 main spans of 397 feet each. The decision of the Indian Railways to go for welded construction for a bridge of such magnitude gave a fillip to the welding industry in the country.

The Narmada

The rivers in the west, the Narmada, the Tapti and the Chambal are erratic and treacherous both in respect of their course as well as the subsoil under their bed. It took a lot of survey and skill, and a great deal of ingenuity and labour, before these rivers could be spanned at various places. One of the bridges built over the Narmada in 1861 near Broach was seriously endangered by a flood in 1876. It was repaired and was kept constantly under observation. Eventually it broke down as a result of a flood three years later and was finally replaced in 1881 by an entirely new

The Jubilee Bridge near Bandel, opened on 15th March 1987, Eastern Railway
Wellington Bridge near Bally Eastern Railway





Above Left The girder span moved into position

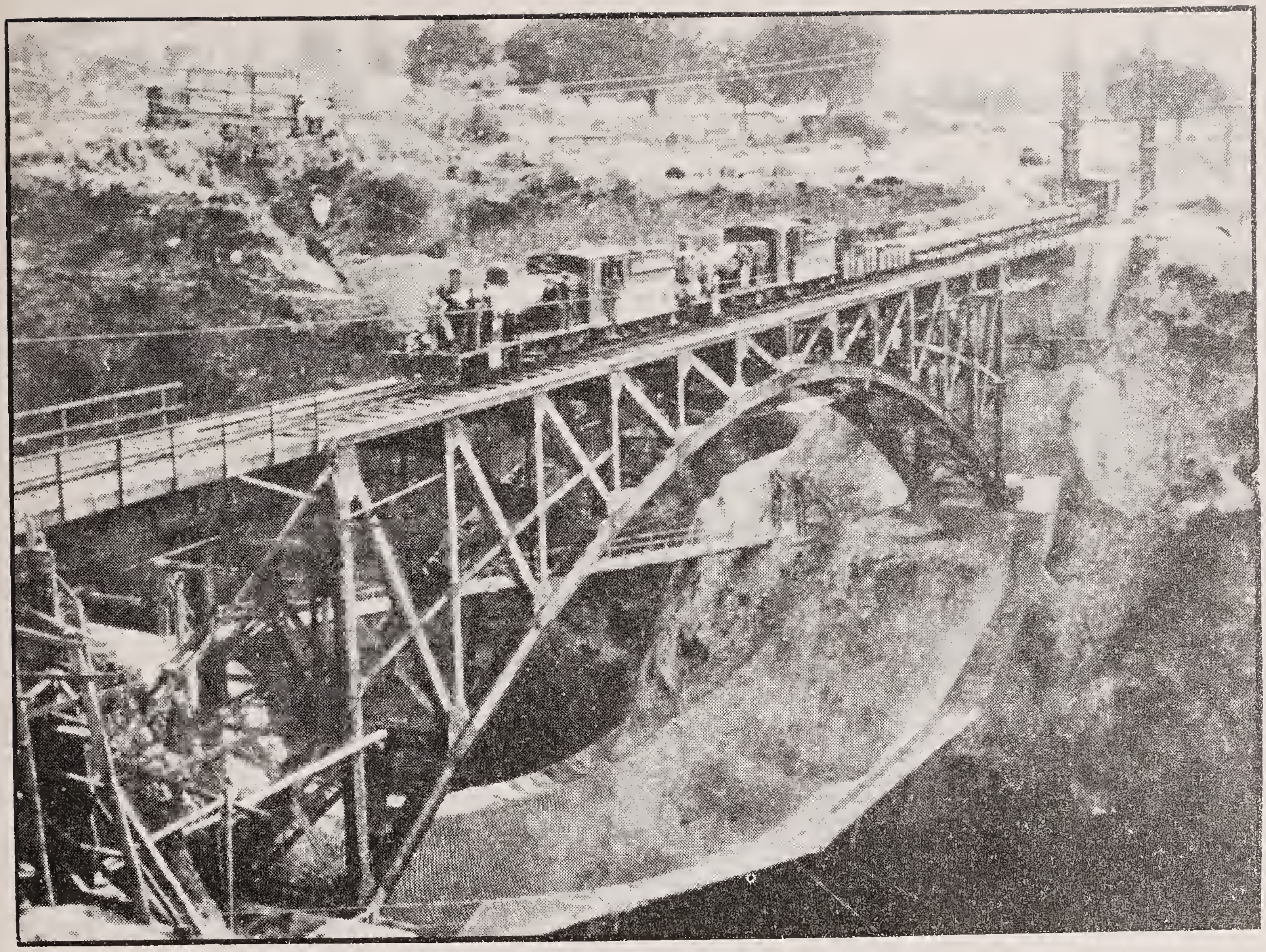
Above Right A view of the roadway

Below View of the Completed Bridge.

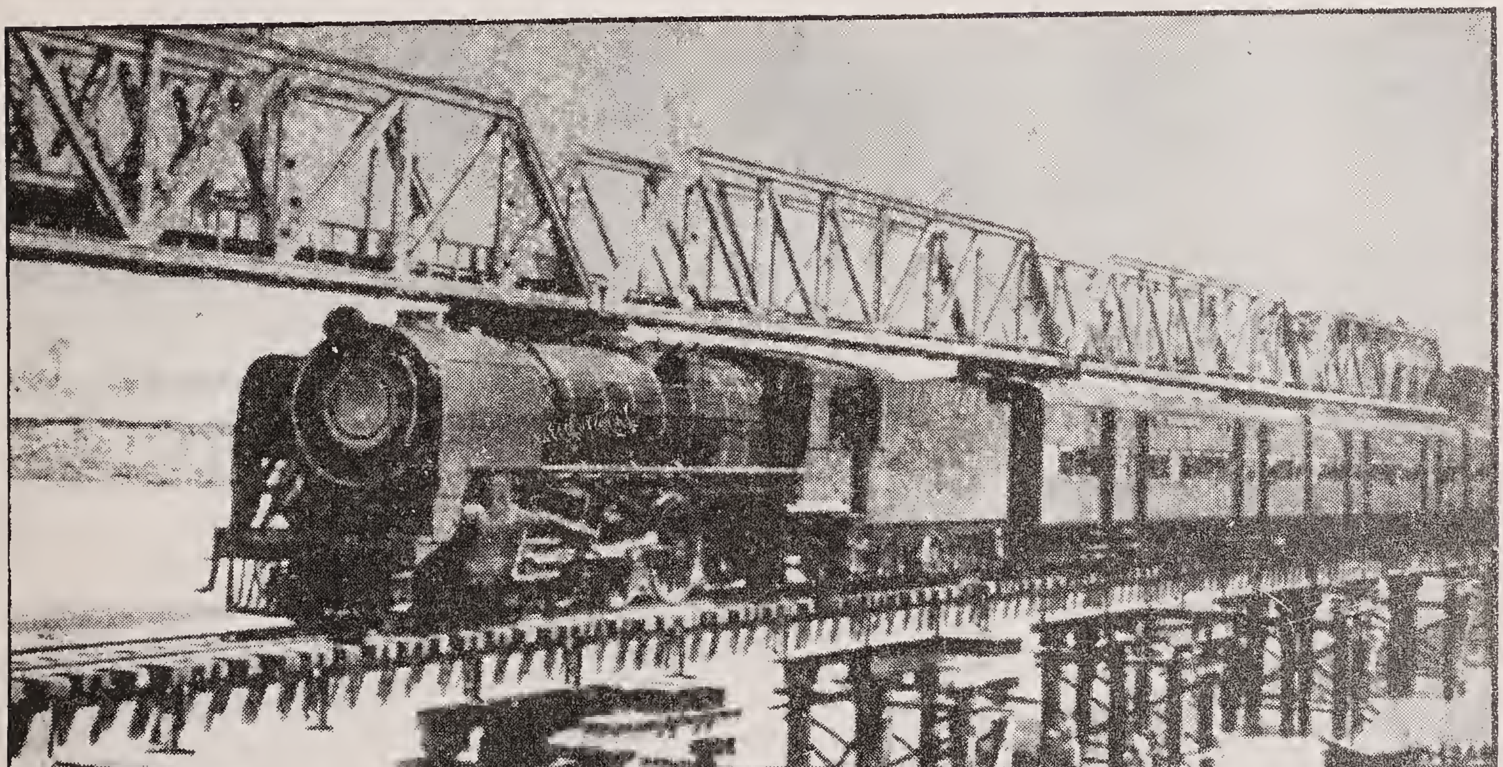
A panoramic view of the Dufferin Bridge over the Ganga as originally constructed looking at the girder from the right bank up-stream side.

A view of the blockhouses at the Kashi (Banaras) end of the Dufferin Bridge. Observe the platform of Kashi Station in the foreground.

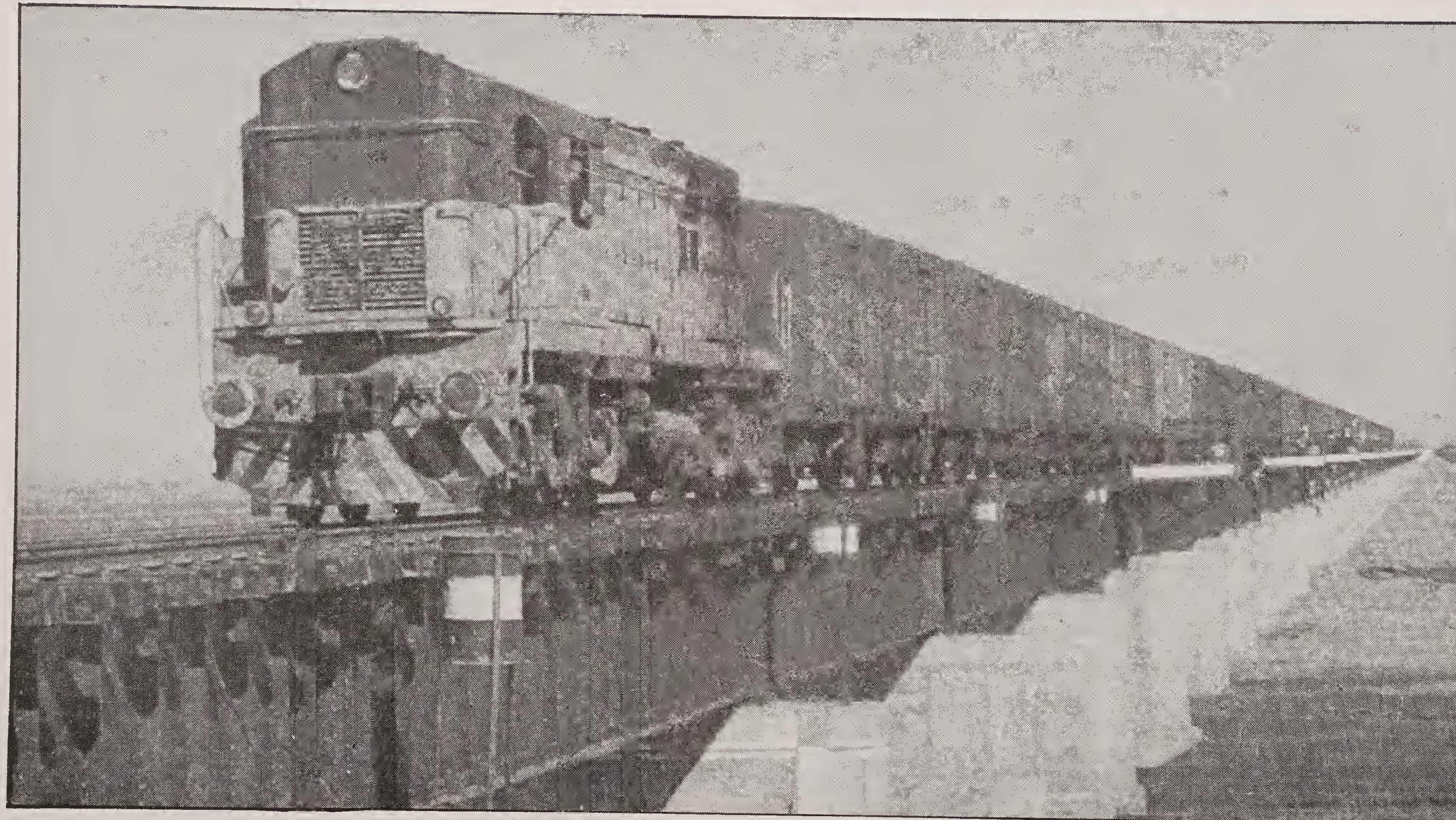
The same bridge as regirdered in 1947 and renamed Malaviya Bridge



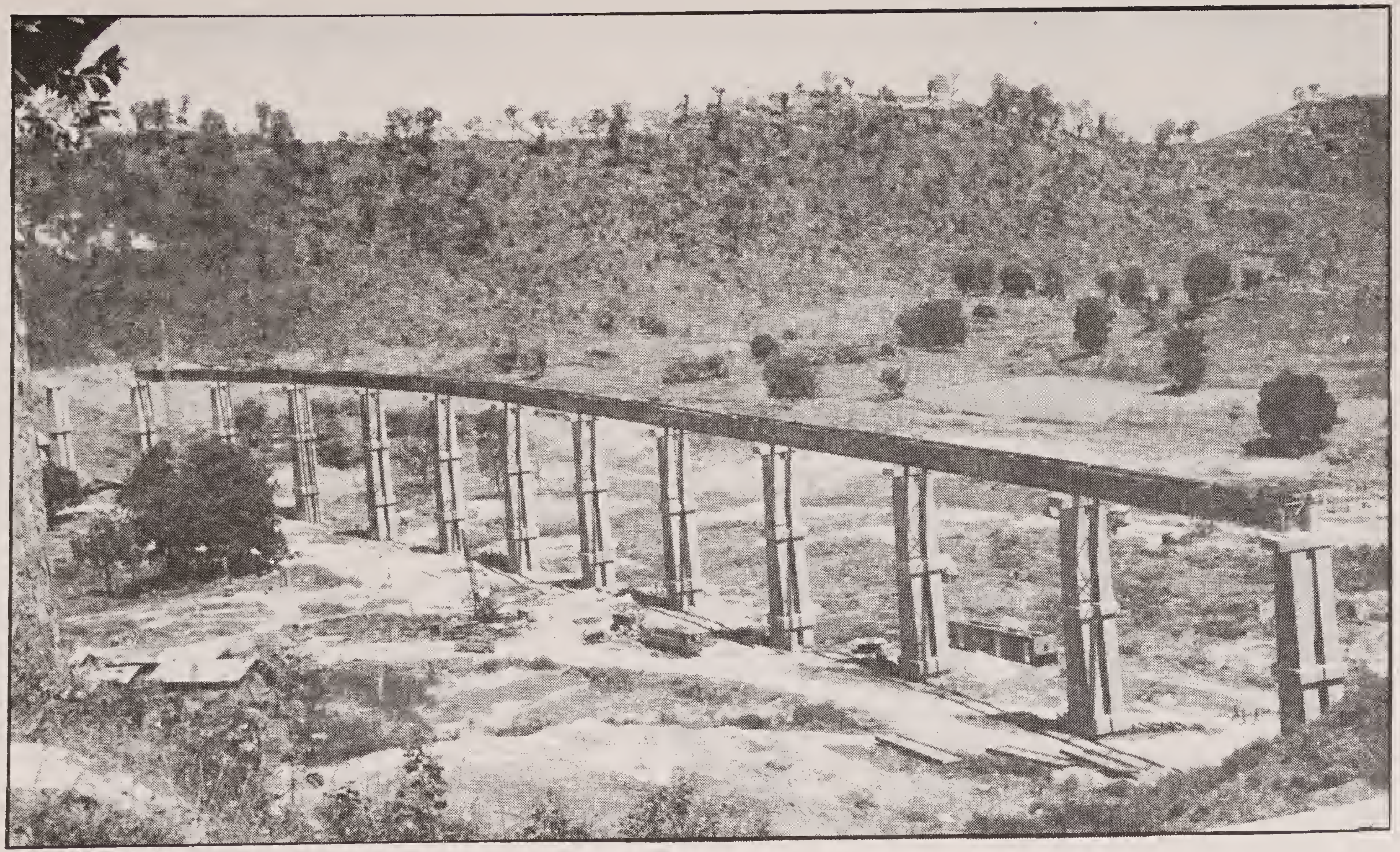
Reond Nullah arch bridge on the Kangra Valley Railway. This is the only steel arch bridge in India — Photo supplied by H.S. Virdi.



Re-girding of Rapti Bridge— Gorakhpur-Gonda section, North Eastern Railway, showing pile bridge in the foreground. The work was done in 1954



The first diesel hauled goods train on the 1.13 kilometre long bridge in the Little Rann of Kutch on the Jhund-Kandla broad gauge line opened to goods traffic on September 16, 1969.



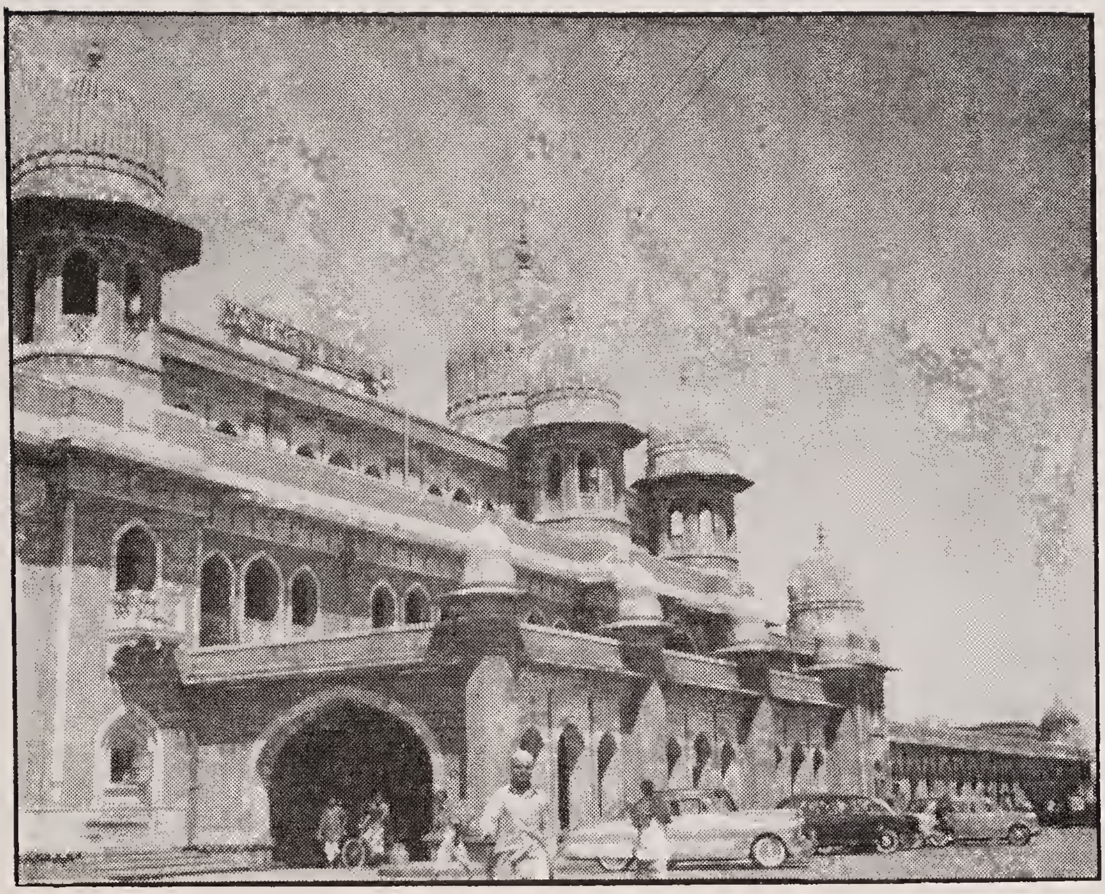
Bridge No. 30 on Karaila Road—Bina-Jayant Project   14×24.8 m composite girder Height of pier   28 m

A tribute to Railway Engineering — the Second Godavari Rail-cum-Road Bridge on the mighty Godavari River near Rajahmundry was an epoch making event in South Central Railway—inaugurated in November 1974.

Another vew of the Godavari bridge at Rajahmundry.

Restoration work in progress at Basantar river breach of a high bank, near Jammu in 1974-75. Apart from the accidents caused by human failure and breakdown of mechanical parts of rolling stock. Indian Railways are prone to havoc caused by the vagaries of nature. In either event, the tradition of prompt restoration of communications has been well established.

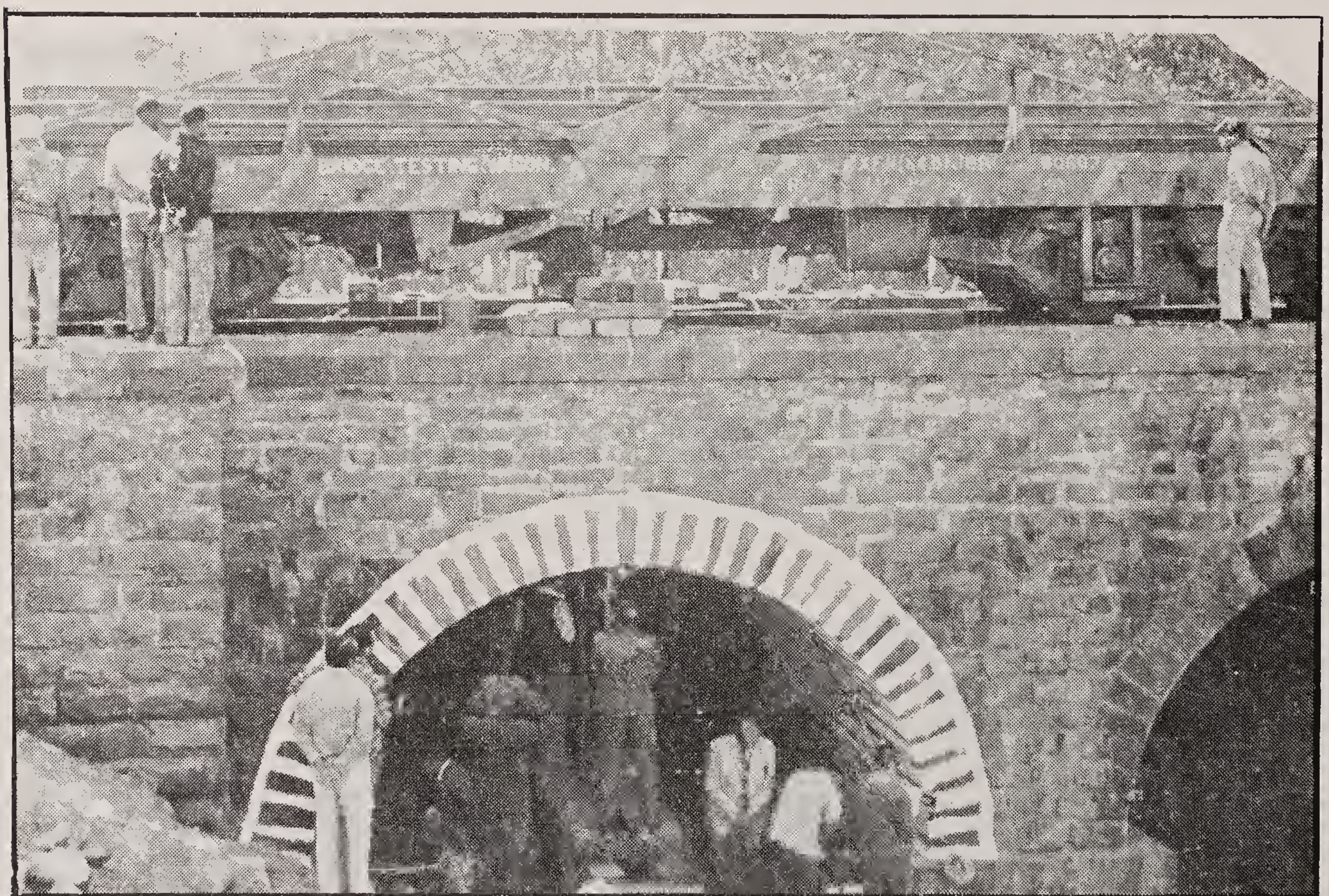
A panoramic view of Delhi Main Station.



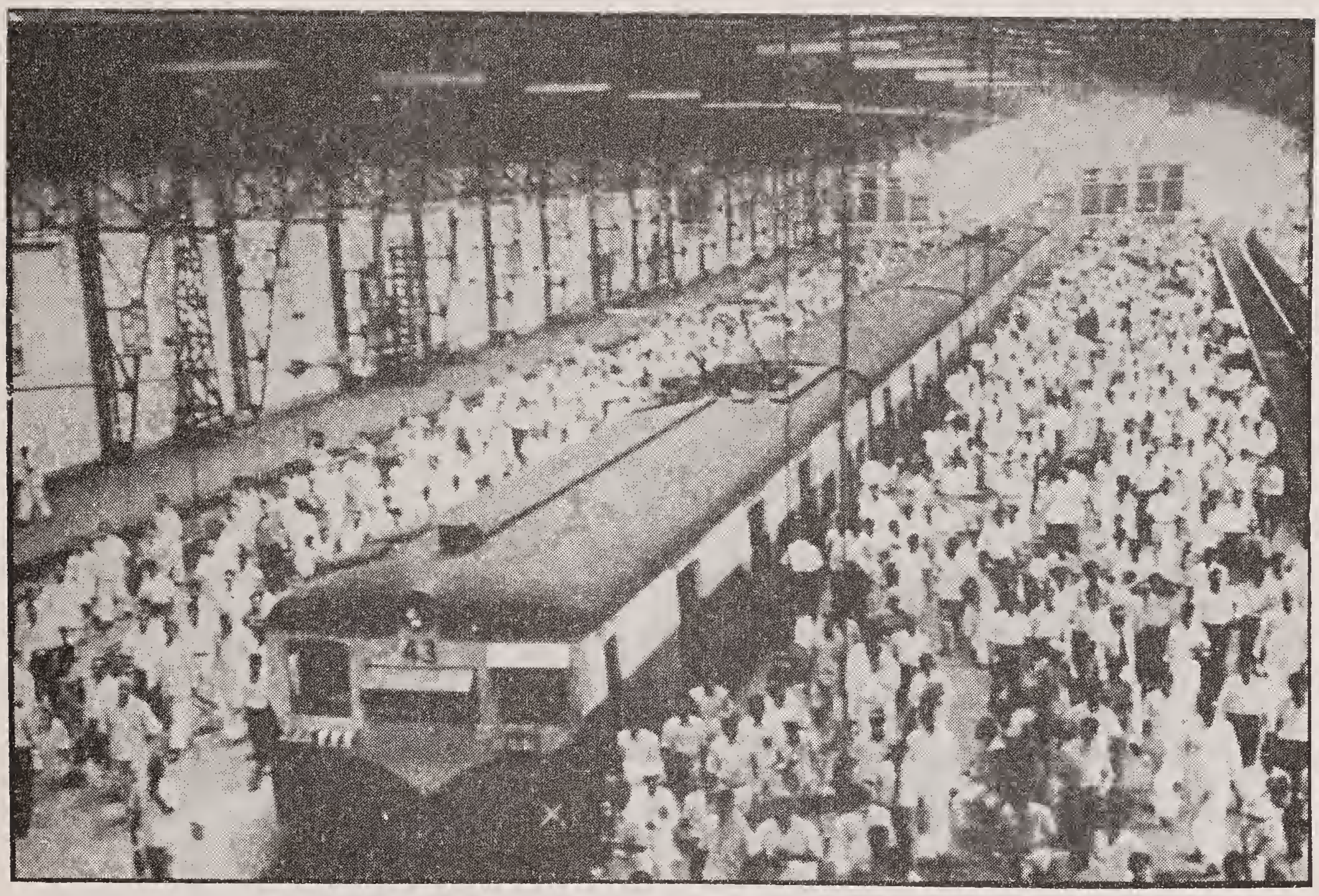
Lucknow Railway Station, Northern Railway.

Nagpur Railway Station, Southern Railway.

Kanpur Marshalling Yard.



Testing of an arch bridge on Bina-Kanti section. The test was done in connection with investigation of bridges to carry 4500 tonne heavy trains.

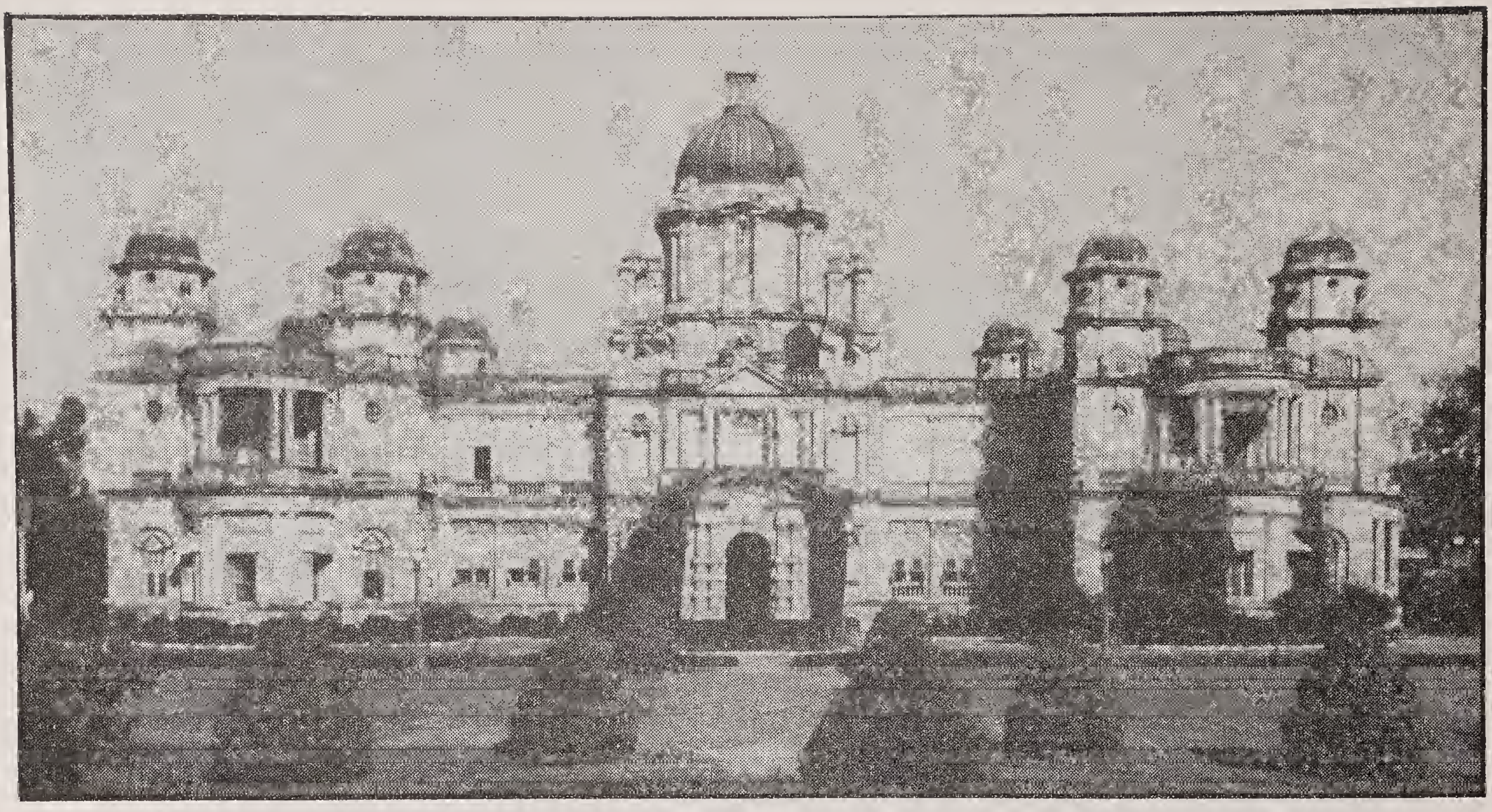


The passenger explosion : above : at Churchgate Station, Western Railway and below : inauguration of a new metre gauge train.

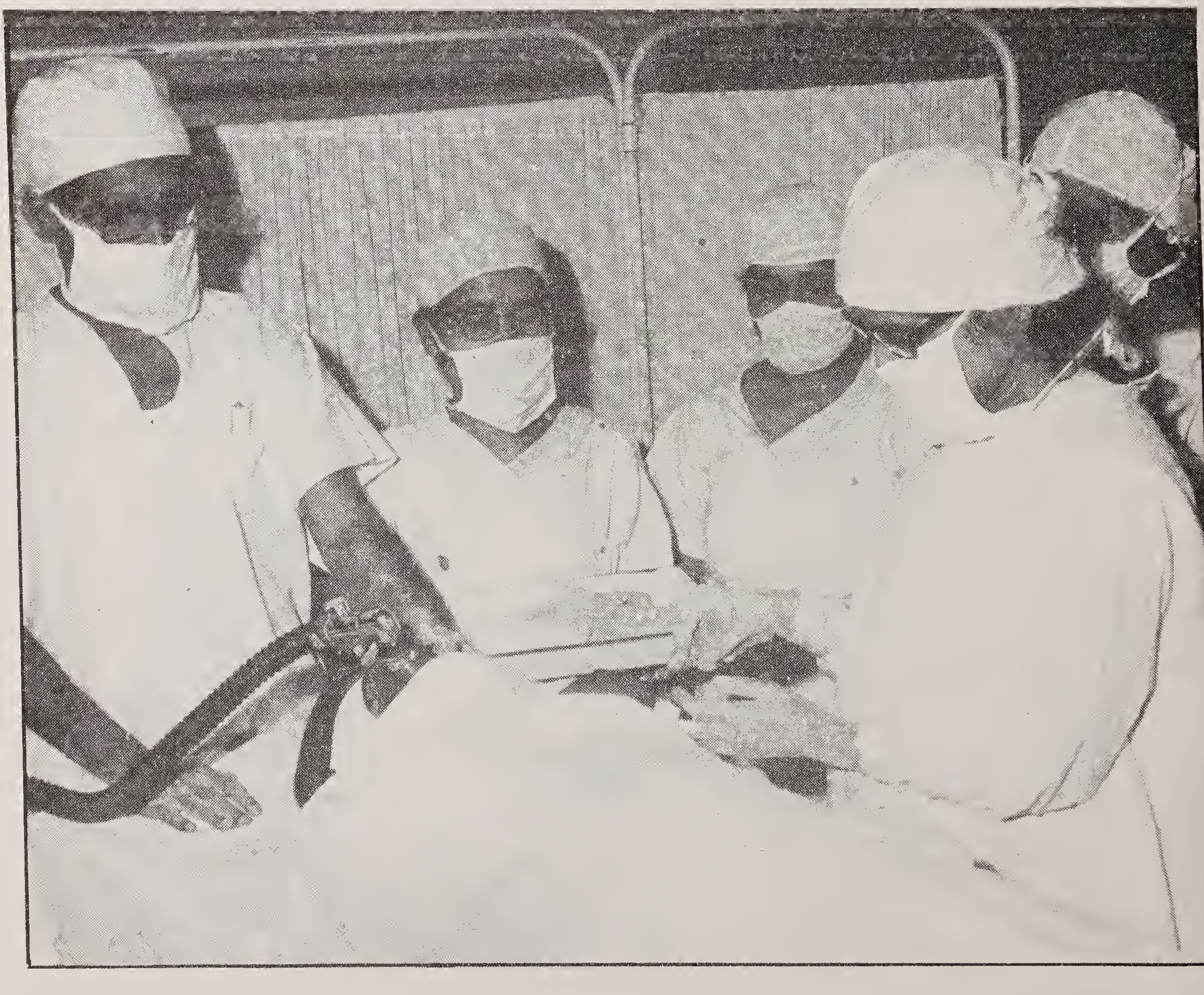
Northern Railway on April 1, 1979.

The interior of an armoured train. The Indian Railways are an important link in the line of communication of the country's armed forces. The Railway Territorial Army Units played an important role in India's border wars in 1962, 1965, and 1971.

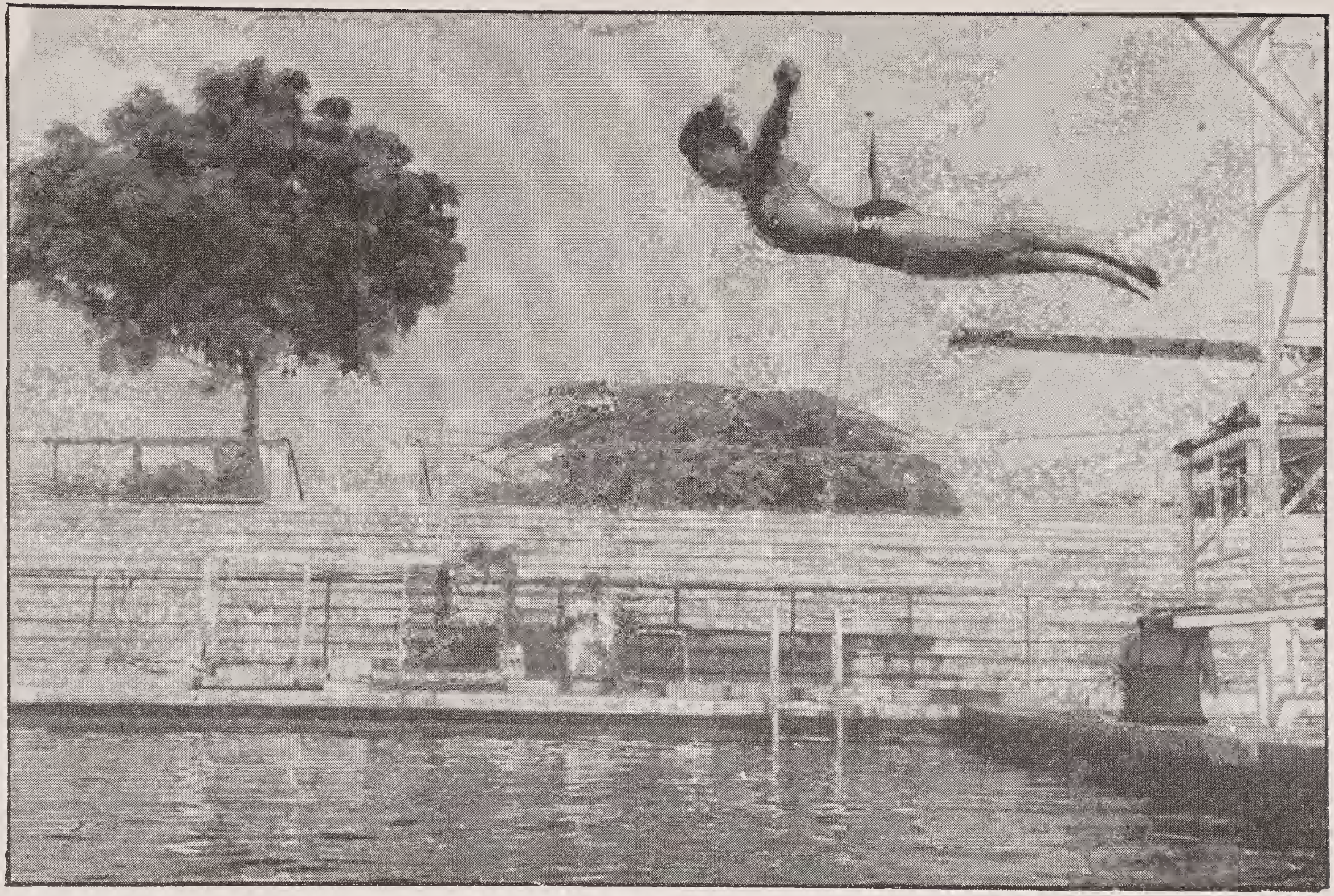
A trainload of elephants was hauled to New Delhi for the Asiad in 1982.



Railway Staff College, Vadodara (Baroda)



Inside an Operation Theatre, Central Hospital, Northeast Frontier Railway.



Sports on the Indian Railways : diving

jumping the hurdles.

viaduct 4.687 feet (1,453 metres) long. The Narmada was also spanned near Mortakka on the Khandwa-Ajmer metre gauge main line in 1876. This 2836 ft (879 metres) structure has triangulated girders designed to carry the rail track above and a road carriageway below.

The Mahanadi

The line from Calcutta in Orissa and further down to Madras presented problems of a different kind. The number of major rivers and their tributaries required to be crossed was very large. The Mahanadi and its several tributaries constituted a vast continuous network of zig-zagging waterways, with a soil bed posing variety of problems. Throughout its course of about 500 miles, the Mahanadi flows through very hilly country and is subject to very heavy floods. Its discharge is out of all proportion to its drainage area.

In early years, several proposals with comparative estimates for different alignments were put forward. It was in November 1896, however, that it was finally decided to cross the river below Cuttack, by means of five separate bridges, spanning the Barang, the Kuakai, the Kathjuri, the Mahanadi and the Birupe. The Mahanadi bridge is situated half a mile below the anicut at Jobra, which is part of the headwork of the system of canals that connect with the Mahanadi at Cuttack and irrigate the whole delta. The total length of the bridge, completed in 1900, is 6912 feet (2,148 meters).

The Bassein

The bridges on the Bassein in western India are also noteworthy. The north and south Bassein bridges jointly are one and a quarter mile in length. They were originally built in 1864 and rebuilt in 1927 after the old structures had been dismantled.

The Hooghly

Bridging the Hooghly continued for many years to be one of the most complicated and baffling problems confronting railway engineers. From the initial stage several schemes were considered for constructing a railway bridge to connect Howrah with Calcutta. A very early attempt to build a bridge over the Hooghly was made in the late forties of the last century at a place called Govindpuri, near Calcutta. Unfortunately,

soon after the bridge was completed the entire structure collapsed. In 1875, a pontoon bridge was completed between Calcutta and Howrah, but only to carry vehicular traffic. The pontoon bridge was finally demolished in 1945 and in its place was constructed a single span cantilever type multipurpose suspension bridge for road traffic, which today ranks among some of the finest bridges of the world.

In 1887, the first railway bridge was built over the Hooghly River, but at a point 28 miles from Howrah. This magnificent structure called the Jubilee bridge, still stands bearing testimony to the ingenuity, skill and resourcefulness of railway engineers of the time. At the site of the bridge the Hooghly channel is 1,200 feet wide, being the narrowest over several miles up to Calcutta. In places the bed is 66 feet deep below mean sea level, and the height of the tide varies from a little below mean sea level to 20 feet above with a maximum velocity of four and a half miles an hour on the ebb tide in freshets. The river is largely used for navigation, and provision had to be made for allowing big country sailing boats, inland steamers and flats of 500 to 600 ton capacity to pass under the bridge. The actual work on the bridge was begun in 1883. The bridge is approached from both sides by masonry viaducts of 3,278 feet and 441 feet respectively consisting of 141 brick arches of spans varying from 10 to 48 feet. The total length of the bridge proper is 1213 feet (376 metres) and of the entire structure about a mile.

Belonging to a much later date (1927-29) the Willingdon Bridge which spans the Hooghly at Bally was by far the most expensive and the most difficult of the railway bridges constructed in India up to that time. At the point where this spectacular structure crosses the river, the Hooghly is 2,520 feet wide. The viaduct at Bally consists of 22 spans of 30 feet girders built on masonry piers, with foundations of reinforced concrete piles 40 to 50 feet deep. The bridge itself consists of seven 350-ft main spans and two 80-ft land spans, making a total of 2,691 ft (834 metres). Another extraordinary feature of the bridge is that the caissons (70 feet by 37 feet) were sunk in a tidal river in four feet of water, with a current at times six miles at hour. It may be mentioned that at periodic intervals the Hooghly river is visited by tidal 'bores' which are known to overturn heavy boats, tear steamers from their anchors, and even pull away floating docks from their moorings. They have been the nightmare of all bridge builders and of everyone connected with navigational work in the Hooghly river. Provision had to be made for the bridge to withstand these tidal 'bores'.

The Tista

The Tista Bridge on the Assam Rail Link is another remarkable instance of bridge building. Rising in glacial heights and fed by snow streams, the river flows through a gorge before it debouches into the plains just above the bridge site at Sivok. The river had changed its course several times in the past. In 1948, the design of the spans originally planned had to be altered owing to a change in the river-bed, and it was decided to build a bridge of four spans of 155 feet with a central span of 250 feet. The wells as well as the river were full of boulders up to four feet in diameter, and therefore, the wells had to be sunk by the pneumatic process.

As the 250-ft girder could not be end-launched, it had to be assembled on an island in the bed of the river, slewed to come alongside the span and raised on top of the piers before the floods which were expected after the month of March. The odds were heavy on both sides, viz. if the girder was not erected in time and floods came, it would be washed away and replacement of this girder would take another year, whereas if the erection was not done before the 1949 monsoon, the bridge could not be opened in January 1950, the target set for it. The risk was taken and through the excellent work of all concerned, the girder was erected and taken on top of the pires just two days before the floods came. All girder erections were completed on 25 June 1949 when the river was in high flood. The bridge was opened for goods traffic on 9 December 1949.

The Tista which was estimated to take a discharge of two and a half lakh cusecs, brought in, as a result of exceptionally heavy rainfall, a discharge of about six lakh cusecs and in the early hours of 12 June 1950, the flood over-topped the left guide bund and caused a breach of 750 feet in the embankment at the back of the east abutment and of 80 feet at the back on the west abutment. Dislocation to this vital line of communication could not be allowed to remain indefinitely. Incessant day and night work by the staff of the Assam Rail Link through heavy monsoon and floods enabled restoration of the line of communication on 2 August 1950. After the addition of three more spans of 155 ft each, the bridge became 1347 ft (426 metres) long.

The Brahmputra

Until the construction of the Brahmputra bridge, Assam was served by a metre gauge system on the south of the Brahmputra river and another on its north, the two systems being connected by wagon and passenger ferries between Amingaon and Pandu, near Gauhati. A bridge across the

river had been considered from time to time since 1910, but after Independence, the project assumed vital importance. Investigations were taken up vigorously and the Amingaon-Pandu site was selected as being the best from all points of view. Work on the foundations started in October 1959 and the bridge, consisting of ten spans of 397 feet each and two spans of 105 feet each, total length, 4,247 feet (1,317 meters), was completed in March 1963. The bridge carried a double line metre gauge track on the lower deck and a 24-ft. wide roadway with six-ft. wide footpaths on either side, on its upper deck. The design provided for conversion of the metre gauge double line to a single broad gauge track. A clearance of 40 ft. was provided between the normal high flood level and the bottom of the girders to permit free navigation at all times. The bridge was formally opened by Pandit Jawaharlal Nehru, the then Prime Minister of India, on 7 June 1963.

A Bridge Built on a Swamp

The proposal to extend the broad gauge into North Gujarat dates back to 1879 when a reconnaissance survey was carried out of two routes for a broad gauge link with Sind viz. (i) northern route by way of Palanpur to Hyderabad (Sind) and (ii) southern route through Kutch State. This was followed by a number of surveys over the following sixty years. A detailed survey for a broad gauge line from Viramgam to Maliya was made in 1904. Two years later, a reconnaissance survey of the two routes proposed earlier was again conducted, as a result of which the southern route through Kutch was recommended for construction. The proposal had, however, to be dropped on account of opposition from the then Ruler of the State to a railway line passing through his territory. Attention was, therefore, directed to the northern route, which was further surveyed four times between 1908 and 1946. With the loss of Karachi port on the partition of the country in 1947, there was urgent need for a major port somewhere nearby to take the place of Karachi and ease the pressure on Bombay port. And thus Kandla came into the picture. A metre gauge line connecting Kandla with Deesa was built in 1952. The proposal for a broad gauge link, however, remained in abeyance as Kandla port was opened at a major port only three years later. A traffic survey of a broad gauge line between Jhund and Kandla was carried out in 1960, and again in 1963. The construction work was taken in hand in June 1964. The alignment required conversion of the existing metre gauge section between Dhrangadhara and Halvad, a distance of 31.26 kilometres, to broad gauge, and crossing the marshy Little Rann of Kutch at its narrowest neck of about 8 kilometres between Maliya and Samakhiali stations.

Opened in Stages

The work of construction commenced from both ends, and the completed sections were opened to traffic in stages. The Jhund-Dhrangadhra section (52.72 Kms.) was opened to goods traffic on 27 March 1968 and to passenger traffic on 1 May 1969. The Dhrangadhra-Halvad section was converted to broad gauge and opened to both goods and passenger traffic on 9 November 1968. The Halvad-Maliya section (46.10 kms) was opened to goods traffic on 21 March 1968, and that from Maliya to Kandla (104.03 kms) on 16 September 1969. In December 1969, the whole line from Jhund to Gandhidham, which is the main station serving Kandla area, was opened for passenger traffic. Passenger traffic between Gandhidham and Kandla, which was mostly local, continued to be catered for by metre gauge trains.

The project involved construction of 213 minor and 45 major bridges including the longest bridge of 1.13 kilometres (62 spans of 18.6 metres each). It also involved construction of a long embankment across the Little Rann of Kutch. This embankment and the longest bridge are unique engineering features of this rail link. The Rann is a vast barren, flat, low-lying area impregnated with salt, extending to about 120 kilometres. Its width varies from about 8 kilometres near the railway alignment to as much as 80 kilometres at its eastern end. Basically, the Rann is the drainage basin of a large number of rivers with their catchment areas in Saurashtra and Kutch. During the monsoon, as many as fifteen rivers drain into this basin and the water level rises about 1.5 metres over the ground level, covering a vast expanse. The flood waters drain away at the end of the monsoon into the Gulf of Kutch. In fair weather, during high tide the waters from the Gulf travel about 15 to 20 kilometres inland from the site of the railway alignment, leaving a sheet of water, a foot high over the ground. Thus the place is one vast swamp. Nothing grows here and there is no life except some wild asses of a species found nowhere else in the world. Even these asses are facing extinction and their number has come down to 362 against nearly a 1000 a few years ago.

The swamp consists of a top layer of about 2 metres of brown stiff clay formed over 3 metres deep soft bluish clay. The entire subgrade is characterised with high moisture content, high compressibility and inadequate shear strength. Since the tidal water almost always remains over the soil, it is too soft even to support the weight of a man. Laying a railway track and building a bridge across this treacherous terrain presented very difficult engineering problems. The line could only be laid over an

embankment on marshy ground. Work on the embankment was begun by scraping out the dry ground under the bank to a depth of 15 centimetres to remove salt incrustation and decayed vegetable matter. It was then rolled by four passes of crawler tractor. Over the rolled surface, several layers of sand were laid and the bank was gradually made up.

The embankment led on to the long bridge of 62 spans of 18.6 metres each on the line across the Hadkia Creek near Surbari in the Little Rann of Kutch. The discharge expected to pass through the bridge was calculated at 3,79,000 cusecs and the waterway was planned accordingly. The bridge, which was designed to withstand earthquake effects, was founded on 63 single circular wells of 6.8 metres in diameter each taken to depths ranging from 18.6 metres below the bed level. Some of the wells were partly filled with water to keep their weight to the minimum. The substructure consisted of solid mass concrete piers supporting deck type steel plate girders. The bridge cost Rs. 1.70 crores.

Tunnels

The earliest tunnels on the Indian Railways were built on the Thal and Bhore Ghats on the GIP Railway in the 1860s. The first of these was No 24 near the Reversing Station on Bhore Ghat. It had a length of 1,023 ft (317 metres) on 5'6" gauge. There were four other tunnels in this group, Bhore Ghat No 13 near Thakurvadi 1,305 ft, (405 metres) built in 1862, Thal Ghat No 2 near Kasara, 1,629 ft, (505 metres) built in 1864, Thal Ghat No 7, 1,461 ft, (505 metres) and No 8, 1,247 ft, (387 metres) both built in 1864 near Igatpuri. The arch in the lining of tunnel No 8 was removed by means of a cradle operated by a crane in the course of "daylighting" this tunnel, an interesting work undertaken in 1947-48.

In 1899, the Madras and Southern Mahratta Railway built the Castle Rock tunnel near the station of that name. This was 1,242 ft, (385 metres) long and the first long tunnel on the metre gauge. Also in the south, two other tunnels were built on the same gauge: Nandicanama, 1,527 ft, (473 metres) in 1890 by the Madras and Southern Mahratta Railway and Ariyan Kavu 2,924 ft, (906 metres) in 1904, by the South Indian Railway.

In the east, the first tunnel was built by the Bengal Nagpur Railway on the broad gauge in 1890. This was Bhortonk, 1,000 ft, (310 metres) on Khodri-Katni branch. The BNR also built in 1892 the Sarnada tunnel 1,641 ft, (509 metres) near Goilkera. The Assam Bengal built in 1903 tunnel No 22, 1,923 ft, (597 metres) on the metre gauge between Mahur and Daottahagar. In the north, the North Western Railway built in 1903,

four tunnels on the 2'6" gauge Kalka-Simla Railway. There were at or near Koti, 2,280 ft (707 metre), Tara Devi, 1,598 ft (495 metres), Simla, 1,125 ft (349 metres) and Barogh, 3,752 ft (1164 metres) known for its extraordinary length.

Level Crossings

There are 41,946 level crossings on the Indian Railways, of which 15,314 (36.5 per cent, where both road and rail traffic is heavy or visibility is restricted) are manned. The busy manned crossings are being increasingly provided with quick operating lifting barriers in place of the conventional leaf type gates. Safety devices are also being progressively provided at the more busy level crossings.

20

Railway Operations

The word 'operation' did not form a part of the vocabulary of the railways in India for the first sixty years of their existence. It did not figure as a subject till 1910 in the Index of Proceedings of the Railway Branch of the Public Works Department. There was, however, an omnibus term 'traffic' covering such diverse subjects as agreements between railways, exercise of running powers by one railway over the lines of another, government control over railways, enhancement and reduction of rates and fares, levy of tolls on those portions of the railway bridges which were used by the ordinary public, road traffic, statistics, opening of new lines, commodity returns, interchange, postal services, recruitment and appointment of officers, promotions in the Superior Revenue Establishment of State Railways, quarters for staff, earnings, etc. Under the heading 'Transportation' there figured a couple of minor subjects only.

Fuel

As no railway can work without fuel, coal was one of the earliest subjects which claimed the attention of the railway companies, both their Agents in India and he Home Boards in London. For the first few years, coal for railway engines in India was imported from England. In 1861, the Secretary to the East India Railway in Calcutta wrote to the Company's Chief Engineer that Burdwan coal was of an inferior quality though it was being used in stationary engines. The retail price in Calcutta was six annas a maund (there were 16 annas to a rupee) or Rs. 11.3 a ton. The Secretary added that Jessop and Co's foundry in Calcutta invariably used English coke, which was selling in Calcutta at Rs. 1.4 annas a maund. He did not know of any coke made from Indian

coal in use. He had obtained some samples of coke made from Raniganj and Beerbhum coal and was sending these to England for trial in a locomotive engine.

It was known in the beginning of the nineteenth century that coal lay buried in the Raniganj coalfields and the decision to build the experimental line of the East Indian Railway north-westwards from Calcutta was largely dictated by the prospect of tapping this mineral. In the middle of the nineteenth century, indigenous production of coal had not yet developed and English coal and patent fuel were imported in large quantities for burning in railway locomotives in India.

Wood was also extensively used as fuel in locomotives ; for instance, in 1905, the Madras Railway used 42,000 tons. The biggest user of wood was the North Western which consumed over 76,000 tons in that year. Wood was obtained for Rs. 4 to 5 per ton, while coal varied between Rs. 5 on the East Indian and Rs. 15, inclusive of freight, on the BB & CI. As the thermal value of one ton of coal was equivalent to $2\frac{1}{2}$ tons of wood, the main reason for using wood was that it was locally available while the supplies of coal were uncertain due to the long hauls involved.

Imported Coal

During the year 1855-56, after the East Indian Railway extended the experimental line upto Raniganj, 100,000 tons of coal were transported from Raniganj to Calcutta. By 1860, however, 40 collieries were functioning, producing about 282,000 tons of coal annually in the Raniganj area. Even though coal production had started in considerable quantities because of the great distance to which it had to be transported—Bombay, Madras, Karachi and other places—large quantities of coal from England and South Africa were still being imported into the country by sea. The cost of inland transport proved too high and even in the Calcutta market English coal was at times sold cheaper than domestic fuel. In order to meet foreign competition and to increase the consumption of Indian coal by other railways and by various mills and factories, the East Indian Railway reduced the rate for leads over 300 miles from 5.4 to 4.5 pies per ton mile (there were 12 pies to an anna).

The import of English coal gradually declined with the exploitation of Raniganj and other Indian coalfields. In 1895, most Indian Railways were using Indian coals, except the GIP, BB & CI, Rajputana-Malwa, Jodhpur-Bikaner and Bhavnagar-Gondal Junagarh-Porbandar Railways. But in the beginning of the twentieth century, a reduction in the price of English coal and the introduction of patent fuel checked this development.

English coal again entered into competition with Indian coal in some of the markets, Bombay especially, and thus the imports of English coal and patent fuel during 1901 increased from 91,710 tons to 272,630 tons, and of coal from other countries from 4,939 tons to 79,108 tons. Coal was being imported in this period also from Natal, Transvaal and South Africa. The quantity of Indian coal consumed by railways increased marginally from 1,867,185 to 1,905,530 tons, but there was an increased demand for coal for private factories and domestic consumption.

As the production of coal increased, leading simultaneously to an increase in the demand for Indian coal and gradual pricing out of imported coal, haulage rates continued to be progressively reduced by the railways. In 1869, the total coal traffic inclusive of foreign coal carried over the Indian Railways was 1,311,000 tons. In 1951-52, the total output of coal stood at 35,148,949 tons of which 32,761,000 tons was carried by rail, bringing to the railways a revenue of Rs. 26.63 crores, being over 9 per cent of their total income and 17.3 per cent of the total freight earnings.

Railway Collieries

From the very beginning, the railways in India developed and exploited their own collieries. The East Indian and the North Western Railways had collieries of their own. Those of the North Western railway did not produce much coal, but the East Indian Railway obtained all its coal from its own collieries, and it was due to this circumstance that its fuel cost was so little and it was able to keep its working expenses at a low percentage of its gross earnings.

Out of a total of 6,184,054 tons of coal consumed by railways in 1923-24, 1,692,876 tons was obtained from railway collieries. In view of the rise in the price of coal which seriously affected the cost of railway working, the increase in the amount of coal obtained from railway collieries was of considerable importance. In the more important collieries worked by railways the average cost per ton of coal ranged from Rs. 2.9 to Rs. 5.6, which compared very favourably with the price for similar coal in the open market. The existence of these collieries ensured to the various railway lines a regular and assured supply for a considerable portion of their requirements at a price which was independent of market variations. The total quantity of coal despatched by railway collieries during 1950-51 amounted to 2,342,545 tons, of which 2,308,139 tons, or 98.5 percent was despatched to Indian Railways. This represented 22.2 per cent of the total coal consumption of the railways during the year.

Coupling at the End

It will strain the imagination of most people to learn that at one time goods and passenger vehicles of the Indian railways carried a coupling device at one end only. How railwaymen in the nineteenth century managed to put vehicles together to form a train must have been a feat worthy of the respect of their present day successors. In 1890, the East Indian and the Madras Railways had not fitted even their passenger vehicles with couplings at both ends. The goods stock of most of the railways had couplings at one end only. One of the reasons for carrying on with one coupling was economy in expenditure, though an extra coupling then cost Rs. 22 only.

Some railways like the GIP and the BB & CI joined up good vehicles with side chains, not using screw couplings at all. Some others like the BNR took the position that they experienced no inconvenience working with one coupling only. The Public Works Department of the Government of India, of which the railways formed a branch, was not quite sure whether it had the legal authority to force guaranteed companies to incur the extra expenditure. The noting in the PWD files (Annexure 20 A) makes fascinating reading.

Time on the Line

An interesting question which arose during the first decade of the coming into being of the Indian railways was the time to be kept in on the line. So long as the East Indian and the Great Indian Peninsula Railway were growing in isolation from each other, the problem did not exist. But it surfaced as soon as Calcutta was linked with Bombay. There were two schools of thought : one in favour of observing the local time for trains and the other for having a uniformly standard time for the entire run. The latter approach bristled with difficulties as the local time differed from region to region and what is known as the Indian Standard Time had not yet been evolved. For instance, there was a difference of 17 minutes between the clocks at Allahabad and Varanasi (Banaras) in 1865. The matter went up to the Secretary of the State, who along with the Government of India took the view that this difference could be easily absorbed at an engine-changing station and the new local time picked up by through trains. The decision was, therefore, in favour of observing the local time. The Public Works Department communicated this to the Government of Bengal in a letter, which will make curious reading today (Annexure 20 B).

Train Movement

The earliest method of moving trains between stations was the 'One Engine Only System' in which one engine operated all trains on a particular section and there was, therefore, no danger of collisions. This system is still in use on some unimportant branch lines in India. A variation of this was the 'Pilot Guard System' in which the same guard worked all the trains and was dressed in a distinctive uniform for easy identification. With the increase in traffic, it became necessary to allow more than one engine and guard between any two stations and the 'Train Staff and Ticket System' came into vogue. In this system, a single conspicuously painted baton, known as the 'Train Staff' was allotted to a pair of adjacent stations, between which it was carried by the drivers. As there was only one such Train Staff, trains could not run in opposite directions between any two stations. In the case of a following train, the Train Staff was shown to the driver of the first train and a special ticket was given to him. The Train Staff was then carried by the driver of the following train who was also given warning of the time of departure of the preceding train. This system is no longer in use on the Indian Railways.

The next stage was the adoption of the 'Absolute Block System' under which no train was allowed to leave a station unless permission to do so had been obtained from the station ahead and such permission was not given unless the portion of line between the two stations, known as the 'block section,' was clear of trains or any other obstruction. Originally this permission was obtained on the Morse telegraph instrument and issued to the driver on a printed ticket called the 'Paper Line Clear Ticket.' After the issue of a paper line clear ticket to the driver, it was the responsibility of the station masters on either side of the block section to see that no other train was permitted on the section until the entire train, for which the paper line clear ticket had been issued, had reached the next station. The Absolute Block System is presently in use practically all over the Indian Railways and paper line clear tickets are still in use on some branch lines.

As the number of trains increased, the paper line clear ticket system was found too slow and was therefore, replaced by 'Tokens' consisting of small steel balls drawn from a 'Token Instrument' with electrical locking arrangements, which permitted only one token relating to the section between two stations to be taken out at one time, with the co-ordinated action on the part of the two station masters. It was impossible to take out a second token unless the first token had been deposited in the token instrument at the other end of the section after the train had reached there. The token System ensured greater safety than the Paper Line Clear System

but suffered from a disadvantage in that the driver had to slow down for picking up the token, and if he failed to do so or overcarried it or the token was lost or damaged, detentions used to occur. 'Tokenless Block Instruments' were therefore introduced in the year 1979, which worked on the same principle but were interlocked with the starter signal. The driver proceeded by the indication of the starter signal and did not have to pick up a token.

On the double line instruments for giving line clearance to trains were usually interlocked with signals to prevent one train following another. A 'Lock and Block' type of double line block instrument made it impossible to give line clear for a section between two stations, already occupied by a train. On all double line non-suburban sections on the Indian Railways, both broad gauge and metre gauge, the minimum requirement is Lock and Block. The Automatic Block System was introduced on the double line sections of very high traffic density, such as the suburban sections in Bombay, Calcutta and Madras. The movement of trains was controlled by stop signals with the passage of trains past the signals. The line was track-circuited throughout and divided into series of short sections, each of which was governed by an automatic stop signal. Other important developments to speed up train movement and achieve higher standards of safety during recent years were the multiple aspect colour light signalling, track circuiting of reception lines within stations and route relay interlocking at large stations.

Train and Traffic Control

Control of train movement was a feature of the railways in India from their very inception. First, the telegraph and later the telephone was used extensively for the purpose. Generally, trains were controlled from a central point at the headquarters of a district. As goods and passenger traffic grew and the intensity of train movement increased, sub-control offices were established at other points. Control of trains was supplemented with the control of rolling stock, locomotives, goods wagons and passenger coaches so that these assets could be put to optimum use. Special controllers were appointed in the 1930s to watch the movement and keep track of special types of rolling such as oil tanks, brake-vans, bogie rail flats, military vehicles etc. Thus a control organisation was developed over the years, capable of meeting, in addition to the day-to-day requirements of railway traffic, a variety of uncommon situations, such as large religious gathering and concentration of troops and military stores at the time of war.

Time-Tables

Printed time-tables appeared as soon as the first public train for carrying passengers was run on the Indian Railways. Ever since then, they have been the collector's items and much valued by railway enthusiasts and others who have a sense of history. See annexure 20 C and 20 D for samples. By stages, the time-tables were consolidated so that all trains running on a particular railway line were featured in one publication. When the railway lines ceased to exist in isolation from each other and joined up, for instance the GIP and the Madras Railways at Raichur and the GIP and the EIR at Jubblepore, the need arose for further consolidation. The appearance of an Indian Bradshaw was an event of great significance as it provided to the traveller the time-tables of all passenger trains running throughout the length and breadth of the country. The first All India Hindi Time Table was published in May 1930 at Varanasi.

The formation of the time-tables of through trains running over more than one railway line was a task of formidable dimensions, which required co-ordination, first between neighbouring lines to be followed by co-ordination among all railway lines. This co-ordination was secured at the level of the Railway Board, who undertook the responsibility of calling a meeting of the time-table officers of all the railways. This has been done twice a year, as due to a sharp contrast between the two major seasons, the summer and the winter, many trains have to follow different timings. Also, as new long distance trains are being progressively introduced throughout the country, continuing co-ordination at the central level has been found necessary.

The time-tabling of trains was extended to goods trains, as the means of communication and the instruments of effective control over goods movement improved. Like passenger trains, goods trains are also charted on master charts for each section of the railway and follow paths which regulate their through running across divisions and zones. Thus express goods trains across the country, say from Delhi to Bombay and Calcutta to Madras, run according to pre-determined timings. As in the case of passenger trains, the paths of such through goods trains are developed by means of close co-ordination among the railways.

An interesting development in the charting of train time-tables has been the use of computer for the purpose. Given certain loads and speed, the manual calculation of the time required by a train to cover the distance between two stations is susceptible to several errors. The computer, taking note of the time factor for acceleration, deceleration, curves, gradients, speed restrictions etc. produces far more accurate timings.

Movement of Coal

The movement of coal surfaced as a baffling problem almost with the birth of the Indian Railways. Along with that there was also the basic question of the lack of adequate financial resources. To take an example, there was a complaint in 1859 from the Bengal Coal Company against the East Indian Railway regarding the supply of insufficient number of wagons for loading coal. The company said that it was prepared to load 45 but was given only 35 trucks daily. The movement of coal claimed then, as of now, the attention of the highest authority in the land, and in the nineteenth century, of the Secretary of State in London. Drawing the attention of the Governor-General of India in Calcutta to this complaint, a despatch from the Secretary of State stated that while iron work had been supplied for constructing 300 open-sided and 500 hopper coal wagons, building of only 120 open-sided and 351 hoppers had been sanctioned. The London Board of the East Indian Railway wanted an explanation from their Agent in Calcutta for this lapse which had resulted in shortage of wagons for loading coal.

There were several instances of the railway companies striving to extend their lines and eventually facing a traffic explosion for which they found themselves quite unprepared. In his book *"History of the East Indian Railway"*, G. Huddleston wrote: "As soon as the EIR constructed a line into the centre of the field (Jherriah), coal companies were formed, sidings applied for faster than they could be put in and a rush of traffic came which was so sudden that it was almost beyond the power of the railway to carry it. The consequence was that the railway while making the most strenuous effort to provide additional facilities was blamed instead of thanked......". Subsequent to the opening of the Toposi and Jharia collieries branches in 1895, export of coal through Calcutta jumped like this: 137,000 tons in 1891, 574,000 tons in 1896, 1,995,000 tons in 1901 and 2,767,000 tons in 1905. The traffic placed the East Indian Railway under very great strain and the Home Board of the Company pressed the Government of India for better facilities, such as more rolling stock, and defended the railway against frequent attacks by the mercantile community.

But such attacks continued. Complaints of congestion on the Indian Railways were made quite frequently and the British interests in India who had the monopoly of the coal trade, registered their protests directly with the Secretary of State in India Office, London. Referring to a memorandum presented to him by the London Chamber of Commerce, the Secretary of State wrote as follows to the Governor-General in January 1912 :

> "The primary request of the deputation was that a committee of experienced officers should be appointed to investigate and report whether the congestion of traffic throughout India is due to shortage of wagons or inefficient handling. I should be glad if you will consider the desirability of specially investigating...the difficulties that have arisen at what may be regarded as the chief centres of congestion and will take such action as may seem to you most useful towards preventing their recurrence......"

Perhaps the absence of screw couplings at one end was a contributing factor. A report of 1913 is typical of the situation highlighting the difficulties faced by coal trade. Excerpts from it are reproduced as Annexure 20 E, which has a contemporary flavour about it. The Secretary of State and the London Chamber of Commerce were placed in juxtaposition as the Planning Commission and the Railway Board in the 1970s.

A post of a temporary additional member of the Railway Board was created for a period of six months to investigate the congestion of traffic on Indian Railways. There was the allied question of priorities between irrigation and railways and the Secretary of State hoped that the Governor General will give the needs of the two demands his carefull consideration. The Secretary of State also asked the Governor General to consider the question of increasing the amount of the annual rupee loan. At this stage, raising of capital in India came to be considered as a viable means of financing railway development.

Movement and Distribution of Coal Controlled

As the movement of coal continued to remain an intractable problem, it became necessary to impose controls during World War I. At the end of the war, it was expected that raisings will go up and there will be large stocks of coal at the collieries making it possible to withdraw the coal control system. Sir George Godfrey, Coal Controller, therefore offered on 3 February 1919 to relinquish his membership of the Railway Board. He suggested the appointment of a Coal Transportation Officer to deal with matters regarding transportation by rail and its distribution and that the Mining Engineer Railway Board should deal with the allotment of requisitioned coal, whether for Government Railways or the public. But a few years later, as there was a lot of dissatisfaction regarding wagon supply, the Railway Board found it necessary to re-establish an organisation for giving priority in the allotment of wagons for coal. This task was entrusted to a committee consisting of the Chief Mining Engineer to the Railway Board as Chairman and two representatives, each of the Indian Mining Federation and the Indian Mining Association.

The scheme which was enforced during 1923-24 for regulating the supply of wagons in the coalfields originated in a series of conferences held in Calcutta in July 1922 by the Hon'ble Member for Railways and was introduced from 15 November 1922. Under this scheme preference in the supply of wagons was given by the Coal Transportation Officer to the requirements for consumption by railways, by specific public utility concerns and to such consumers as could arrange to take supplies in rakes of 50 or half rakes of 25 wagons at a time. All other consumers had to arrange for their coal in direct communication with their supplying collieries and no authorisations from the Coal Transportation Officer were required.

The railways themselves were frequently the sufferers from short supplies of coal caused by paucity of wagons and congestion. During World War II 1939-45), which was obviously a difficult period, the railway stocks of steam coal dropped to 12 days and failed to improve due to the communal disturbances in some parts of the country, prior to and after the partition of the subcontinent.

Control on Distribution Removed

The movement and distribution of coal has fluctuated over the decades, depending upon the interaction of various factors, the state of the economy, the raisings of coal, and the mobility of the railway system. Being the most important fuel in India, it provides the Indian Railways with one-third of their freight traffic and its movement in turn largely determines the generation of power, manufacture of iron and steel, and many other industrial products. While one-third of the coal produced is consumed locally in Eastern India where the bulk of it is mined, two-thirds moves to other parts of the country to distant destinations, the farthest of these being in Maharashtra and Gujarat, about 1,500 kilometres from the coal-mines. Such destinations have been generally vulnerable to shortage of coal, calling for special measures, not always successful, by the railways to feed them.

There have, however, been some periods of easy availability of wagons and adequate distribution. In 1964-65, coal, except the coking variety for steel plants, was available in abundant quantities and so were railway wagons and locomotives. Control on distribution was therefore removed. Such bright patches were however few and far between. In 1971-72, loading dropped on the Eastern and the South Eastern railways due to the poor law and order situation. Loading suffered particularly in Andal and Asansol areas which were the scenes of the worst anti-social activities. Thousands of wagons were immobilised from theft of wagon parts. Tracks fittings were removed in colliery sidings. Staff were manhandled, mobbed and even killed. Labour trouble on these railways

contributed to the drop in efficiency. Coal loading from Bengal and Bihar fields also suffered a set back in December 1971 owing to the Indo-Pakistan war when military movements had to be given top priority.

Movement in Block Loads

To maximise movement, the clearance of commodities of general traffic originating in bulk from specific stations or areas, in block train loads was arranged. During 1971-72, the percentages of wagons moved in block rakes to the total number of wagons loaded, for major groups of commodities were as under :—

Commodity	*Broad gauge*	*Metre gauge*
(i) Coal	71.0	Nil
(ii) Mineral oils	86.0	53.0
(iii) Exports ores		
(a) Iron ore	99.4	80.5
(b) Manganese ore	84.6	85.3

As an incentive to movement in block trains, a freight concession of two per cent was notified for coal traffic offered in train loads at one time from one forwarding station or loading point to one destination station on one forwarding note, that is from one consignor to one consignee. Some concessions in freight rates for movement of coal during the slack season from June to September were also allowed, from 50 paise per tonne for distance between 500 and 1,000 kilometres to Re 1 per tonne for distance greater than 1,500 kilometres.

Express goods trains were introduced on important trunk routes for quick transit of goods within guaranteed periods. As a further step towards the optimisation of movement, Indian Railways have progressively increased the trailing loads of their freight trains, which was made possible with introduction of diesel traction in 1958. Electrification of selected trunk lines and lines carrying heavy mineral traffic was undertaken commencing from the mid-fifties, as this mode of traction was found to be more economical than diesel traction for higher levels of traffic density.

The percentage of block load movement to total traffic carried on 1984-85 for certain important commodities was as follows :—

Commodity	*Broad Gauge*	*Meter Gauge*
Coal	95.88	78.54
Mineral Oil	86.38	79.54
Iron Ore	100.00	68.39
Manganese Ore	95.10	86.10
Cement	90.30	47.73

Growth of Traffic

As a result of the introduction of diesel and electric traction, the adoption of the automatic buffer coupler, and measures taken to increase the trailing loads of trains, the growth in the traffic handled by the Indian Railways has been impressive. The increase in Indian Railways' freight traffic during the plan era 1951-1985 has been from 44 billion tonne-kilometres to 182 billion tonne-kilometres and of passenger traffic from 66.5 billion passenger-kilometres to 227 billion passenger-kilometres. The growth of total traffic units has thus been from about 111 billion to 409 billion, an increase of nearly 300 per cent during this 35 year period.

Strategies Employed

Substantial gains have, of late, been achieved by means of new operational techniques — segregation of roller bearing and central buffer coupler stock from the conventional screw coupler wagon fleet, integrated end-to-end operation of trains, optimisation of trailing loads on trains, rationalisation of train examination and integration of locomotive hauls. The strategy for operating longer trains, especially for bulk commodities like coa and minerals, has been given sustained attention. Carrying more per vehicle means increased axle-loads and load per metre of track.

Wagons able to exploit fully the track capacity for transport of heavy commodities have been developed. Till the middle of the century, practically all the goods traffic was being carried in general purpose wagons—the covered, open high-sided and open low-sided wagons. The standard wagon on broad gauge was evolved as a 10.31-tonne tare 4-wheeler with a maximum loading capacity of 22.19 tonnes. The standard on the metre gauge was 5.69-tonne tare wagon of 18.69 tonne carrying capacity. Now a numbee of new bogie wagons with emphasis on higher payload and facility forr loading and unloading special types of traffic have been put into service. These are BOX, BCX, BOBX, BOY, BOXN, CRT etc. It has been decided to go in for bogie type wagons only, as the 4-wheeler wagon is a non-viable unit in the present context of bulk movement of commodities. These wagons have been designed to run heavy freight trains of upto 7,500 tonne trailing loads at speeds of upto 90 kilometres per hour and will enable large quantities of coal and minerals to be carried over busy trunk routes where line capacity investments have to be conserved, A quantum leap in the form of 50-wagon multiple-headed rakes of the new BOXN wagon with trailing loads of 4500 tonnes is on the cards.

The Passenger Explosion

The passenger traffic on the Indian Railways grew beyond expectations during the nineteenth century and has been growing steadily during the twentieth. In the third quarter, it multiplied three times. Since the closing years of the First Five-Year-Plan, passenger traffic registered a steady growth till 1967-68. In 1968-69, hower, it declined. This temporary setback to the growth of passenger traffic, was reversed in 1969-70, during which it increased by 5.91 per cent. The average lead of non-suburban passengers has increased steadily, from 69 kilometres in 1950 to 78 in 1969. The increase in Indian Railways' passenger traffic during the plan era has been from 66.5 billion passenger-kilometres to over 200 billion passenger kilometres. It was, therefore, not surprising that an exceptionally large number of new long-distance express trains were introduced in the seventies, which could be aptly termed a decade of passenger explosion. One of these, between New Delhi and Eranakulam covers a distance of over 3,000 kilometres. Another, the Pink City Express between Delhi and Jaipur attained the maximum speed of 100 kilometres per hour on the metre gauge.

Double-Decker Trains

The seventies also saw the running of a few double-decker trains, introduced to cope with the growing numbers. This was not an innovation as two-tier trains were tried during the first decade of the Indian Railways in 1860s, but were not found popular with the passengers. The Sinhagad Express was the first double-decker train in the country in the twentieth century, introduced between Bombay VT and Pune and this was followed by double-decker coaches on the 'Flying Ranee' between Bombay Central and Surat. Also to cater to the heavy movement of passengers between certain important cities, some trains were double-headed, notably K. K. Express between New Delhi and Bangalore-Trivandrum. A number of other bi-weekly and tri-weekly express trains were added to serve pairs of stations between which new passenger traffic had developed following the growth of industry, such as Chandigarh-Ranchi and New Delhi-Ahmedabad. An interesting development in passenger operation was the introduction of a few classless trains on the lines of the 'Janata' express trains, which first ran in 1948.

Accidents

From the very inception of railways in India, accidents received

detailed and careful attention. They were reported promptly, properly investigated and followed up both in the punitive and preventive aspects. Senior officers made it their business to visit the site of an accident, sift evidence and make personal observations to determine the cause. The case study of a derailment suffered by a mail train on the East Indian Railway in 1857 is presented in Annexure 20F. It will be noticed that after due investigation, a detailed report was submitted by the Agent E.I.R. to the Consulting Engineer to the Government of India. An interesting offshoot of the accident was the fear felt by the railway administration that in the event of the company administration taking strict punitive action, concerted industrial action by the railway staff was a likelihood of which it had to be very-careful.

In a letter dated 8th February, 1860 from the India Office to the Governor-General-in-Council, the lapse of the non-submission of the annual return of accidents for the years 1858 and 1859 was pointed out, and it was desired that the return "be prepared at once and sent to this office and that you will give directions for their supply in future as soon after the close of the year as the information can be collected." This will give some idea of the importance attached by the Government of India at the highest level to the need for taking preventive measures.

Public Interest in Accidents

The interest of the Public in railway accidents was equally strong as the following news item published in the Times of India of 8 December 1880 will show :

> "Fortunately, people in India possess an almost entire immunity from terrible railway accidents such as happen every now and then in England, and particularly at this period of the year. From some returns recently published, we learn that no less than eight hundred persons were killed, while nearly three thousand were injured, on the railways of the United Kingdom during the nine months ending September 30. In India during the same time the number of persons killed was probably not more than two hundred, if so many, but when the railways cover India as they cover England, casualties, on railways will, we fear, be considerably increased. In India the length of the railways is, we believe, considerably under nine thousand miles, while in the United Kingdom it is between seventeen and eighteen thousand miles. But it is the immense number of trains, the rapidity with which they succeed each other, and carelessness in working the block system of signalling that cause so many accidents on English lines.

Probably railway servants are more careful in this country than their brethren at home. In India, in the three months ending June 30, eighty persons were killed on railways, but of these only seven were passengers, and six are said to have met with their deaths from misconduct or want of caution. Three passengers were injured, six railway servants killed and twenty seven were injured from causes beyond their own control. Thirty-nine servants were killed and one hundred injured from misconduct or want of caution. One person was killed whilst passing at a level crossing, twenty three while trespassing and two committed suicide. One person was injured in attempting to commit suicide, and two killed from what is described as 'miscellaneous causes,' probably the slowness of the trains!"

The figures for 1857 show that in all the three Presidencies, Calcutta, Bombay and Madras, there was a total of 38 train accidents which were classified under three heads, namely accidental 10, mechanical failure 9, and negligence of railway servants 19. The number was small as the railway system consisted of a little over 3,000 miles. As the system expanded and the density of trains increased, in 1900, when the mileage had increased to 24, 760, the total number of serious accidents on the Indian Railways was 233, which caused the death of 18 passengers and 21 railway employees and injuries to 95 passengers and 84 railway employees.

In 1911, one Mr O. Lloyd published from Agra an interesting booklet entitled "Secret Doings on Indian Railways (A book intended to show that in the event of accidents the Indian Railway authorities purposely conceal the true nature and extent of the resultant casualties)."

He cites several serious accidents and evidence to prove his thesis, *e.g.*,

1. RMR January 21, 1892—collision between Up Mail and Down Goods at mile 272-4 between Ajmer and Madras ;
2. May 6, 1908—two crowded passenger trains (26 from Delhi and 23 from Ghaziabad) colliding at 5.54, 3 miles from Ghaziabad between Dasna and Ghaziabad—Railway Administration report 72 killed, 118 injured—Lloyd estimate 400 killed.
3. December 25, 1907—collision of 2 passenger trains at Ludhiana and Ladhowal. Official report 15 passengers and 6 railway servants killed.
4. June 29, 1902—EIR loop train left Calcutta as usual near 4 pm; about 8 hours out from Calcutta it was blown off the line by tornado just about Rampur Halt station. Thirteen vehicles were dashed down off the embankment—not at all a high one, but the wreck was complete. This disaster was in no way the fault of the railway......"

Ever since then, the growing interest of the general public, the passenger associations, Members of Parliament and the State Governments has kept the Railway Board and the railway administrations on their toes in regard to the avoidance of accidents as much as possible.

Complaints are often heard that the public confidence in the railways has been shaken by the increase in railway accidents. Accidents, by their very nature, do not occur with any regularity, and a spate of them in a short period, may arouse public indignation, as has happened more than once during recent years. Part of the explanation for this is that the public are now much better served by newspapers and other mass media, than was the case before independence and their spokesmen are inclined to be more vocal. But Indian Railways have shown time and again that the rate of accidents has been steadily falling.

The incidence of serious accidents, which result in loss of life, injuries or damage to property, viz, collisions, derailments, trains running into road traffic at levelcrossings and fires in trains, per million train kilometres has gradually declined from 2.7 in 1965-66 to 1.5 in 1984-85. The following table covering the 1965-85 period, furnishes figures of such accidents, as well as records the improvement in the incidence per million train kilometres :

Year	Collisions	Derailments.	Fires in trains	Level crossings accidents.	Total	Incidence per million train km.
1	2	3	4	5	6	7
1965-66	74	962	42	123	1201	2.7
1970-71	59	648	12	121	840	1.8
1973-74	66	578	13	125	782	1.8
1974-75	66	696	23	140	925	2.2
1975-76	64	768	27	105	964	2.0
1976-77	45	633	16	86	780	2.5
1977-78	54	705	14	93	866	1.6
1978-79	55	778	12	86	931	1.8
1979-80	72	692	21	115	900	1.8
1980-81	69	825	29	90	1013	2.0
1981-82	87	936	23	84	1130	2.2
1982-83	54	653	20	70	797	1.5
1983-84	48	621	17	82	768	1.4
1984-85	39	678	30	65	812	1.5

Preventive Measures

Preventive measures taken by the Indian Railways to control the incidence of accidents cover a wide range from such simple measures as the fencing of the line to the installation of sophisticated devices on the locomotive and the track which will give a driver automatic warning about the status of signals and the line ahead of him. Lack of resources has, however, stood in the way of any large scale adoption of such devices, thus leaving a lot of leeway to be made up as compared to the developed countries.

To avoid accidents between trains and road vehicles and animals crossing the track the fencing of the line was undertaken in the early years of railway construction. It cannot be said for certain that this was a uniform practice in every line but there is ample evidence that it was done, for instance, it is on record that in December 1857, Government sanctioned the erection of a fence between Allahabad and Kanpur at the rate of 8 annas per 100 running feet. Rohilkhand-Kumaon Railway, opened in the 1880s was partially fenced. As early as 1865, rules for the guidance of officers for the investigation of railway accidents were laid down and duties of the Consulting Engineer, the District Magistrate, the District Superintendent of Police etc. were defined by Government.

There was further elaboration of the subject in the beginning of the twentieth century when exhaustive rules for reporting, holding enquiries, responsibilities of Government Inspectors, grant of compensation to passengers and railway employees, communication to the press, settlement of claims and delegation of powers to General Managers (upto Rs. 5,000), statistical results, heavy steam cranes for dealing with serious accidents, information to Railway Board in regard to punishments inflicted, medical boxes and relief trains, were framed and widely circulated. The loss of human life used to be heavy in collisions and derailments of passenger trains due to the telescopic and bunching of coaches. A major step taken by the Indian Railways to minimise such loss was the design and construction in 1955 of all-welded steel body coaches which did not telescope. This measure alone has brought down the fatal casualties and cases of injuries resulting from train accidents.

Safety Organisation

In the 1960s, a separate safety organisation, headed by a Director in the Railway Board, officers of administrative grade at the zonal headquarters and of executive rank on the divisions, was set up to deal exclusively with accidents and safety. This organisation introduced certain psycho-technical tests for drivers and other train working employees

to check their suitability for operational functions, devised courses in accident prevention and organised safety camps where the knowledge of the staff could be freshened up without the strain of end-of-term examinations.

Broadly speaking, train accidents are caused mainly due to failure of human element and/or failure of equipment. Since of these two factors, the human factor contributes to the largest number of accidents, the activities of the Safety Organisation have been directed mainly to tackle this aspect of the problem. This organisation on the railways has continued to pursue a multi-pronged strategy for prevention of accidents by way of education, field supervision, technological aids, enforcement of safety rules, maintenance of discipline and awards for displaying extra care and alertness in averting accidents. The programmes consist of audiovisual propaganda, group discussions, man-to-man contacts and seminars to improve safety consciousness amongst the railway staff. Simultaneously, regular inspections and surprise checks by officers, inspectors and supervisory staff of various departments are carried out. In addition, periodical drives are launched on railways giving attention to specific areas of work in order to improve the procedures adopted by the staff in the field. The Commissioners of Railway Safety undertake inspections and conduct inquiries into serious accidents in order to ensure that proper procedures, and methods are being employed on the railways and also suggest improvements in the procedures, equipment and training of staff.

Commission of Railway Safety

An account of the incidence and prevention of accidents on Indian Railways will not be complete without a description of the Commission of Railway Safety, its development and functions. To exercise control over the construction and operation of the first railways in India, which were entrusted to private companies incorporated in the United Kingdom, Consulting Engineers were appointed under the Government of India. Later, when Government undertook the construction of railways, the Consulting Engineers were designated Government Inspectors. In 1883, their position was statutorily recognised. Two decades later, the Government Railway Inspectorate was placed under the Railway Board.

To avoid direct subordination of the Railway Inspectorate to the Railway Board, the Pacific Locomotive Committee, headed by A. H. L. Mount, then Chief Inspecting Officer of the British Railways, suggested

that the inspectorate should be separated from the control of the Railway Board. This principle was endorsed in 1940 by the Central Legislature which recommended that "Senior Government Inspectors of Railways should be placed under the administrative control of some authority of the Government of India other than the Railway Board." The Railway Inspectorate was, therefore, placed under the administrative control of the Department of Ports & Air, thereafter the Ministry of Transport and Communications. The Administrative control over the Railway Inspectorate, which has redesignated the Commission of Railway Safety on 1 August 1966, is exercised by the Ministry of Tourism and Civil Aviation since May 1967. The designations of the officers of the Commission were revised from 21 May 1979 as rhe Chief Commissioner of Railway Safety and Commissioners of Railway Safety.

The principal functions of the Commission of Railway Safety are inspection of new railway lines prior to authorisation of passenger traffic, periodical inspections of open lines ; approval of new works and renewals affecting passenger carrying lines ; investivations into accidents, including inquiries into such accidents to passenger trains as are considered to be of a serious nature and general advice on matters concerning safety of train operation. During recent years, the Commission of Railway Safety on the average held enquiries into 22 serious accidents per annum. Such accidents involved 98 deaths, 348 cases of injuries and damage to Railway assets amounting to Rs, 43.8 lakhs annually.

High Powered Enquiry Committees

From time to time, Government have set up high powered committees to review the incidence of accidents on the Indian Railways. Such committees reported in 1962 and 1968. A seven-member High Power Railway Accidents Enquiry Committee was appointed in 1978 under the chairmanship of a former Chief Justice of India to review the position of accidents since 1968 and suggest remedial measures for their prevention. The Committee submitted Part I of their report in July, 1979 and have since submitted Part II of their report in May 1980, which is under scrutiny by the government.

Annexure 20 A

Office Note—P. W. D. Pros (R. C.) May 1890 Nos 63-75

From this statement it will be seen that, all broad-gauge lines in India have couplings at both ends of passenger stock with the exception of the East Indian Railway (1,341) and the Madras Railway, but most of the coaching stock of the latter (610 out of 719) line is fitted with couplings at both ends.

The goods stock of the following lines have couplings at only one end :—

	No, of Vehicles
East Indian Railway	9,161
Madras Railway	2,819
Great Indian Peninsula (Excepting timber trucks)	7,592
Bombay, Baroda and Central India	5,689
Bengal Nagpur	1,803
Total	25,064

We may perhaps ask the East Indian Railway and Madras Railway to fit all their coaching stock with couplings at both ends at once, and ask them and the other Railways to gradually fit the goods stock with the extra couplings as the vehicles come into shops for repair or renewal.

Taking the cost of an extra coupling at Rs. 22, we find that we could have all the existing coaching stock in India fitted at both ends for less than Rs. 32,000.

And all the goods stock in India for about 5½ lakhs rupees.

Even if it is decided not to press this expenditure on the Companies, it is still for orders, whether we should not require that all new stock should be fitted with couplings at both ends.

F. B. H.

17 April 1890
Under Secretary.

I am afraid, we may have opposition—

1. from the Madras Railway, which says that no inconvenience is felt from having only one coupling, and indeed that this facilitates working the sidebrakes on the Ghats, as it gets them all in one side ;
2. from the Bombay, Baroda and Central India and Great Indian Peninsula, which work all their goods vehicles without any

screw couplings at all, using only side chains without screw couplings ;

3. from the Bengal Nagpur Railway ; which experiences no inconvenience in working with one screw coupling ;
4. from the East Indian Railway, which thinks there is no necessity to provide couplings at both ends of goods stock.

With reference to Mr. Hebbert's proposal to "require" that all new stock should be fitted with couplings at both ends, what are our power under the Contracts in each case ?

M. C. B.

19 April 1890
Mr. Hebbert.

In para 8 of the Contracts with the Great Indian Peninsula, Madras and Bombay, Baroda and Central Indian Railways it is provided that the Company shall provide to the satisfaction of Government good and sufficient stock, plant and machinery.

In para 17 of the East Indian Railway, para 18 of the Indian Midland Railway, and para 22 of the Bengal Nagpur Railway Contracts, it is provided that these Railways must carry out any additions or improvements that the Government may consider necessary for the effectual working of the Railway.

If the East Indian Railway and Great Indian Peninsula Railway are not compelled to provide the couplings at both ends, there is sure to be trouble during mobilization on the North-Western Frontier where vehicles from both lines are certain to run through with stores.

F. L. O'C

30 April 1980
Deputy Secretary

The drafts may issue.

L. C. G.

30 April 1890
Secretary

I think a paragraph might with advantage be added to all suggesting that in all future indents two couplings should be provided.

R. C. B. P.

1 May 1890

Paragraph added accordingly.

Annexure 20 B

No. 544 R, dated 5 July 1865.

(No. 27) From—Lieut. Col. C. H. Dickens, R. A., Secretary to Government of India, P. W. Dept.

To—Joint Secretary to Government of Bengal in the P. W, Dept., Railway Branch.

I am directed to acknowledge the receipt of your letter No. 792 G, dated 1 June 1865, enclosing one from the Deputy Agent of the East Indian Railway, requesting a reconsideration of the orders issued in Public Works Department Circular No. 7, dated 10 April 1864, with regard to the time to be kept on the line.

2. A single standard of Jubbulpoor time, or elsewhere, is again suggested for adoption, as the most convenient for the lines between Calcutta and Bombay. This proposal is the same as Mr. Palmer's of March 1864 on which the Circular orders in question were issued. It is anticipated on the opening of the Allahabad Jumna Bridge, that the system ordered will be productive of inconvenience or confusion, but as yet it has not been practically proved so, and the Government of India is desirous that it may be fairly tried, when should the result confirm Mr. Stephenson's anticipation, there will be no hesitation on the part of the Government in reconsidering its orders. The Secretary of State who at first objected to the system, preferring that the local mean time at each station should be followed, has recently communicated his assent to the system now in use receiving a fair trial.

3. It is not understood how the employees of the Railway can be confused by the change of standard, for where it takes place they will also change, and this was clearly indicated in the orders issued in the Circular. Further, it was said that Allahabad time was to be carried down to the station where the change of administration takes place, probably near Banaras, where the error will be only 17 minutes which is about the time usually consumed at a changing station. But even supposing that the time consumed at the station where the change of standard takes place, was less than the difference of the standards, there need be no confusion in the working of the trains, nor, with clear time-tables and notices, to the passengers. For the further convenience of the latter, the clocks at such stations might have two minute hands with "Allahabad" and "Calcutta" engraved on them and similarly at Delhi.

4. The entry in the time-tables of plus and minus errors would be quite unnecessary by following the plan shown in the attached skeleton time-table, and by giving an additional note with the differences from the

standard, etc., the local time at one or two of the principal intermediate stations.

5. It may, perhaps, be ultimately necessary to have one standard of time throughout India for Railways, but looking to the great differences from local time that would result from the adoption of a single standard, the Government cannot sanction any such arrangement till fully convinced of its necessity.

6. In conclusion, it may be remarked that, it is exceedingly doubtful whether at large centres of business, such as Calcutta and Bombay, the public which are entitled to the greatest consideration, would willingly accept any but local time by which to regulate its Railway travelling.

Annexure 20-E

CONGESTION OF TRAFFIC

Excerpts from the proceedings of a meeting between the Secretary of State and the London Chamber of Commerce on the congestion on Indian Railways.

Present—Marquess of Crewe, Secretary of State for India.
CC. Mc Leod, Chairman of the East Indian Section of the London Chamber of Commerce and others.

Mc Leod—The appointment of Sir Henry Burt as an expert to enquire into the causes of congestion at various sections has given lively satisfaction and the statement that 12 millions (sterling) would be provided for the 1912-13 programme also caused general satisfaction.......

But my Lord...this annual sum of 12 million is quite inadequate...it is quite insufficient to overtake the arrears in provision of equipment and betterment of open lines and to develop fresh areas. The traffic has increased...to such an extent that provision will have to be made for much larger grants—not less than 15 million a year should be provided for the next 5 years, if the prosperity of India is not to be seriously hampered....

The mercantile community in India are alarmed...as to the result of the statement made by the Finance Member of the Governor-General-in Council in regard to the Railway programme in his Budget speech urging caution in regard to railway expansion and expenditure. In view of the effect such a statement may have on the Home Government, it is my duty to point out that trade expansion in India during the past four years has shown beyond doubt that any such fears are groundless, and it may not be out of place to point out here that if the expansion of Indian trade continues on the average of the past ten years, the trade may easily double itself in about 12 to 15 years, a possibility that requires a bold railway policy.... We are fully aware of the difficulties government have in arranging finances on the considerable scale that the very necessary reforms in the Indian Railways require, but we hope that a special effort will be made to meet these liberally in order to avert the danger that is now threatening the many industries in India generally and the coal trade in particular which is so acutely dependent on rail transport....

Crewe—If 15 millions were forthcoming and could be usefully laid out nobody could be more willing to produce that sum than I should be, or the Governor-General of India either, but it would not be right to hold out any sanguine hope that it would be possible to increase the railway provision to an extent which would approach that figure... I can assure you that all you had said will sink deeply into our minds and we shall not fail

to take all possible means of further considering the specific points you have raised."

Referring to a memorandum from the Indian Mining Association, the Secretary of State accepted in a despatch he sent to Governor-General in August 1913, the Association's view "that the capital requirements of the railways should be fully provided without further delay." I take note of the strongly expressed opinion of the Railway Board, "that grants of Rs 1,800 lakhs should at once be definitely sanctioned for each of the years 1914-15 and 1915-16...." I will endeavour to provide the capital required by the Railways for the development of the traffic, but that, in view of the difficulties and uncertainties attending the execution of a programme of ways and means extending over a long future period of time, I regret I am unable to give a guarantee of the nature they desire.

ANNEXURE 20C
[redacted]

(From 1st NOVEMBER 1856, and until further notice.)

GREAT INDIAN PENINSULA RAILWAY.

TIME TABLE,

SHOWING THE TIME OF ARRIVAL AND DEPARTURE OF TRAINS.

NOTICE.—Bombay time is kept at all Stations on the Railway. The Doors of the Booking Offices will be closed punctually at the hours fixed in the following Tables, after which no person can be admitted. To ensure being booked, Passengers should arrive at the respective Stations, and obtain their Tickets, five minutes earlier than the times mentioned.

DOWN TRAINS.

Miles		Week-days 1	Week-days 2	Week-days 3	Week-days 4 1st Class only	Sundays 1	Sundays 2	Fares 1st Class	Fares 2nd Class	Fares 3rd Class
		A. M.	P. M.	P. M.	P. M.	A. M.	P. M.	Rs. a. p.	Rs. a. p.	Rs. a. p.
	Bombay ... **Dep.**	**8 30**	**2 0**	**5 0**	**7 30**	**8 30**	**5 0**			
2¼	Byculla ...... „	8 40	2 10	5 10	...	8 40	5 10	0 6 0	0 2 0	0 1 0
5¾	Dadur .... „	8 53	..	....	....	8 53	....	0 12 0	0 5 0	0 2 0
9¼	Coorla .... „	9 5	..	5 35	....	9 5	5 35	1 4 0	0 8 3	0 2 6
16¾	Bhandoop ...... „	9 28	3 2	5 55	....	9 28	5 55	2 2 0	0 14 3	0 4 3
20¼	Tannah .... „	9 42	3 17	6 7	....	9 42	6 7	2 10 0	1 1 6	0 5 3
33¼	**Callian** ... **Arr.**	**10 18**	**4 5**	**6 45**	....	**10 18**	**6 45**	**4 4 0**	**1 12 6**	**0 8 6**
	Callian ... **Dep.**	**10 30**	..	**6 55**	....	....	**6 55**			
40	Titwalla ...... „	10 35	. .	7 20	....	....	7 20	5 0 0	2 1 6	0 10 0
49½	**Wassind** ... **Arr.**	**11 30**	.	**7 55**	....	....	**7 55**	**6 4 0**	**2 9 9**	**0 12 6**
	Callian ... **Dep.**	**10 23**	**4 15**	....	....	**10 23**	**6 50**			
41¾	Budlapoor ...... „	10 43		....	....	10 45		5 4 0	2 3 0	0 10 6
53¼	Narel .... „	11 17	5 30	...	10 55	11 17	7 42	6 12 0	2 13 0	0 13 6
71	**Campoolee Arr.**	**12 15**	**6 40**	....	**12 5**	**12 15**	**8 40**	**8 14 0**	**3 11 3**	**1 1 9**

UP TRAINS.

Miles		Week-days 1 1st Class only	Week-days 2	Week-days 3 Goods only	Week-days 4	Sundays 1	Sundays 2	Fares 1st Class	Fares 2nd Class	Fares 3rd Class
		A. M.	A. M.	P. M.	P. M.	A. M.	P. M.	Rs. a. p.	Rs. a. p.	Rs. a. p.
	Campoolee Dep.	**3 0**	**6 45**	....	**3 15**	**6 45**	**3 15**			
17¼	Narel .... „	4 6	7 40	....	4 10	7 40	4 10	2 4 0	0 15 0	0 4 6
29¼	Budlapoor ...... „	....	...	....	4 45	....	4 45	3 12 0	1 9 0	0 7 6
37¾	**Callian** ... **Arr.**	....	**8 40**	...	**5 10**	**8 40**	**5 10**	**4 12 0**	**1 15 9**	**0 9 6**
	Wassind .. **Dep.**	....	**7 35**	**12 15**	...	**7 35**	....			
9½	Titwalla .... „	....	8 10	..	....	8 10	....	1 4 0	0 8 6	0 2 0
16¼	**Callian** ... **Arr.**	....	**8 35**	**1 15**	....	**8 35**	....	**2 2 0**	**0 14 3**	**0 4 3**
	Callian ... **Dep.**	....	**8 45**	**1 20**	**5 15**	**8 45**	**5 15**			
50¼	Tannah .... „	....	9 24		5 31	9 24	5 51	6 6 0	2 10 0	0 12 9
54¼	Bhandoop .... „	....	9 37	2 20	6 3	9 37	6 3	6 14 0	2 14 0	0 13 9
61¾	Coorla .... „	....	9 58	...	6 25	9 58	6 25	7 12 0	3 3 0	0 15 6
65¼	Dadur .... „	....	....	..	6 36	.	6 36	8 4 0	3 7 0	1 0 6
68¾	Byculla .... „	. .	10 17	. .	6 47	10 17	6 47	8 10 0	3 9 6	1 1 3
71	**Bombay** ... **Arr.**	**7 30**	**10 30**	**3 30**	**7 0**	**10 30**	**7 0**	**8 14 0**	**3 11 3**	**1 1 9**

DOWN TRAINS.

Miles		Week-days 1	Week-days 2	Sundays 1	Sundays 2	Fares 1st Class	Fares 2nd Class	Fares 3rd Class
		A. M.	P. M.	A. M.	P. M.	Rs. a. p.	Rs. a. p.	Rs. a. p.
	Bombay .... **Dep.**	**8 15**	**5 20**	**8 15**	**5 20**			
2¼	Byculla .... „	8 25	5 30	8 25	5 30	0 6 0	0 2 6	0 1 0
5¾	Dadur .... „	8 38	5 41	8 38	5 44	0 12 0	0 5 0	0 2 0
8	**Mahim** .... **Arr.**	**8 50**	**5 50**	**8 50**	**5 50**	**1 0 0**	**0 6 9**	**0 2 0**

UP TRAINS.

Miles		Week-days 1	Week-days 2	Sundays 1	Sundays 2	Fares 1st Class	Fares 2nd Class	Fares 3rd Class
		A. M.	P. M.	A. M.	P. M.	Rs. a. p.	Rs. a. p.	Rs. a. p.
	Mahim .... **Dep.**	**9 15**	**6 10**	**9 15**	**6 10**			
2¼	Dadur .... „	9 25	6 20	9 25	6 20	0 6 0	0 2 6	0 1 0
5¾	Byculla .... „	9 33	6 30	9 33	6 30	0 12 0	0 5 0	0 2 0
8	**Bombay** .... **Arr.**	**9 45**	**6 40**	**9 45**	**6 40**	**1 0 0**	**0 6 9**	**0 2 0**

PERIODICAL TICKETS will be issued between Bombay and the undermentioned Stations, at the rates entered opposite each in the annexed Table, viz :—

1st Class	For One Month	For Three Months	For Six Months	For Twelve Months
To Dadur	Rs. 18	Rs. 48	Rs. 80	Rs. 140
Mahim or Coorla	„ 20	„ 50	„ 90	„ 160
Bhandoop	„ 30	„ 60	„ 110	„ 200
Tannah	„ 31	„ 75	„ 130	„ 240
Callian	„ 41	„ 110	„ 180	„ 300

2ND CLASS.—To Mahim or Coorla .... Per Six Months Rs. 60; Per Nine Months Rs. 85; Per Twelve Months Rs. 110

SPECIAL TRAINS may be engaged with one or more Carriages attached. For rates, or any other information, apply to the Traffic Manager.

PARCEL RATES	Under 10 lbs.	Under 20 lbs.	Under 30 lbs.	Under 56 lbs.
Between Bombay and Intermediate Stations and Tannah	3 annas.	4 annas.	6 annas.	8 annas.
Between Bombay and Wassind	4 „	6 „	10 „	Rs. 1
„ „ and Campoolee	6 „	10 „	Rs. 1	Rs. 1 8 0

GOODS RATES.	1st Class per Ton	2nd Class per Ton	3rd Class per Ton	4th Class per Ton	5th Class per Ton
	[illegible]	[illegible]	Cotton [illegible]	[illegible]	Opium, [illegible]
	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.
Between Bombay and Tannah	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
„ „ „ Callian	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
„ „ „ Wassind	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
„ „ „ Campoolee	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

N.B.—Consignments of Goods exceeding 112 lbs. in weight will be charged at these rates, the minimum charge being the highest Parcel Rate.

GENERAL REGULATIONS.

Passengers will be booked subject to all the Bye-Laws and Regulations of the Company.

Double Tickets.—First and Second Class will be issued between Bombay or Byculla and Mahim, Coorla, Bhandoop, Tannah, Callian, Narel, Campoolee, and Wassind at three-fourths of the ordinary double fare. These Tickets will be available for return the same day, and those issued on Saturdays will be available for return the same day or on the following Sunday or Monday; they are not transferable.

Children.—Infants in arms will not be charged; Children under 10 years of age, half price.

Tickets must be shown to the Company's Servants, or delivered up to them when demanded. Parties not producing their Tickets are liable to be charged the fare from the most distant Station from which the Train may have started. They are only available on the day of issue. Any person who shall attempt to defraud the Company by travelling or attempting to travel upon the Railway without having previously paid his fare, or who shall in any other manner attempt to evade the payment thereof, is subject to a penalty not exceeding Fifty Rupees.

Smoking.—No person will be allowed to smoke in or upon the Carriages, or in the Company's Stations (except in places or Carriages which may be specially provided for the purpose), under a penalty not exceeding Twenty Rupees.

Luggage.—100 lbs. weight of personal Luggage (not being merchandize, or other articles carried for hire or profit) will be allowed to each First Class Passenger, 40 lbs. to each Second Class Passenger, and 20 lbs. to each Third Class Passenger. All excess over these specified allowances will be charged—for the first 100 lbs., 1 pie per lb.; exceeding the 100 lbs., ½ a pie per lb.; but no less charge than 2 annas in any case. The Company will only hold themselves responsible for Luggage when it is booked, and paid for according to its value; and they recommend Passengers to have their name and destination in all cases distinctly marked thereon, and to satisfy themselves that it is deposited in the Company's Carriages.

Parcels must be delivered at the respective Stations, ten minutes before the departure of the Trains by which they are to be forwarded.

Horses, Carriages and Palanquins conveyed to and from Bombay, Tannah, Callian, Narel, Campoolee, and Wassind Stations, should be at the Stations at least fifteen minutes before the departure of the Train by which they are intended to be despatched, and if to be sent from Tannah, Callian, Narel, Campoolee or Wassind Stations, a notice of 12 hours is necessary.

Horses.—The sender of one horse will be charged at the rate of 2 annas per mile, if two horses are sent together by the same owner the rate for both will be 3 annas per mile, and if three horses are sent together by the same owner the rate for the whole will be 4 annas per mile. The lowest charge for sending a horse will be Rs. 2 8 0.

Grooms.—One groom in charge of each horse will be allowed to travel free in the same vehicle as the animal.

Carriages and Palanquins.—Each four-wheeled Carriage will be charged at the rate of 4 annas per mile, the lowest charge being Rs. 4. Each two-wheeled Carriage or Palanquin will be charged at the rate of 3 annas per mile, the lowest charge being Rs. 2 10 9. Passengers riding in their own carriages pay 1st Class fares.

Dogs.—Each Dog will be charged 2 annas for any distance not exceeding 20 miles, 4 annas for any distance not exceeding 50 miles, and 8 annas for any distance not exceeding 75 miles; but they will on no account be allowed to accompany passengers in carriages.

Lost Luggage.—Articles found in the carriages or on the Railway are placed in a Lost Luggage Office at Boree Bunder Station, where applications should be made for lost articles.

Complaints.—The Company's Servants are strictly enjoined, on pain of dismissal, to observe the utmost civility towards Passengers, and any instance to the contrary if mentioned to the Inspector in waiting, or entered in the Complaint Book provided at each Station, or addressed to the Traffic Manager of the Company, will be immediately attended to.

W. COOPER, Traffic Manager.

Traffic Manager's Office, Bombay.

A photograph of the Time Table issued by the Great Indian Peninsula Railway in 1856, showing the train timings, general regulations, passenger fares, goods rates, parcel rates, etc.

ANNEXURE 20D

[redacted]

BOMBAY, BARODA, AND CENTRAL INDIA RAILWAY.

From 20th November 1864, and until further Notice.

ENGINE DRIVERS' AND GUARDS' TIME TABLE.

DOWN TRAINS.

Miles.	Stations.		Time. Passenger h.	m.	Goods h.	m.
			A.	M.		
	Grant Road*	dep.	7	0		
5½	MAHIM	arr.	7	15		
	Ditto	dep.	7	20		
8¼	BANDORA	arr.	7	23		
	Ditto	dep.	7	28		
29½	BASSEIN ROAD	arr.	8	42		
	Ditto	dep.	8	52		
44	PALOUCE	arr.	10	3		
	Ditto	dep.	10	7		
61	BYSUR	arr.	10	29		
	Ditto	dep.	10	33		
74½	DHANOO ROAD	arr.	11	13		
	Ditto	dep.	11	23		
			P.	M.		
90½	SUNJAN	arr.	12	10		
	Ditto	dep.	12	15		
104½	DAMUN ROAD	arr.	1	0		
	Ditto	dep.	1	10		
113½	PARDEE	arr.	1	42		
	Ditto	dep.	1	47		
120½	*BULSAR	arr.	2	10	A.	M.
	Ditto	dep.	2	20	6	30
125½	BOONSREE	arr.	2	39	6	47
	Ditto	dep.	2	44	6	52
133	BULEMORA	arr.	3	7	7	11
	Ditto	dep.	3	12	7	21
135½	UMULSAR	arr.	3	23	7	32
	Ditto	dep.	3	28	7	42
141½	NOWSAREE	arr.	3	55	8	10
	Ditto	dep.	4	5	8	45
151½	SUCHEEN*	arr.	4	36	8	51
	Ditto	dep.	4	41	9	3
163½	**Surat***	arr.	5	10	9	30
			A.	M.		
	Ditto	dep.	7	0	9	15
165½	AMROLEE	arr.	7	8	9	[illegible]
	Ditto	dep.	7	13	10	[illegible]
172	SION	arr.	7	29	10	22
	Ditto	dep.	7	31	10	27
179	KLEM	arr.	7	52	10	48
	Ditto	dep.	7	57	10	58
184	PANOLEE	arr.	8	20	11	25
	Ditto	dep.	8	25	11	30
194½	UNKLESUR*	arr.	8	42	11	49
	Ditto	dep.	8	47	11	57
					P.	M.
	NERBUDDA FERRY	arr.			12	15
	Ditto	dep.	9	2		
199½	**Broach***	arr.	10	32	P.	M.
	Ditto	dep.	10	42	2	36
207½	CHUMARGAUM	arr.	11	1	2	52
	Ditto	dep.	11	11	3	2
216	PALLEJ	arr.	11	33	3	28
	Ditto	dep.	11	38	3	38
225½	MEAGAUM	arr.	12	[illegible]	4	6
			P.	M.		
	Ditto	dep.	12	[illegible]	4	16
235½	ETOLA*	arr.	12	26	4	38
	Ditto	dep.	12	36	4	48
241½	**Baroda**	arr.	1	11	5	21
	Ditto	dep.	1	21	5	29
250½	WASSUD	arr.	2	1	6	16
	Ditto	dep.	2	7	6	[illegible]
265½	ANUND	arr.	2	[illegible]	6	51
	Ditto	dep.	2	[illegible]	7	1
270	NERIAD	arr.	3	15	7	40
	Ditto	dep.	4	25	7	55
285½	MEMDABAD	arr.	4	57	8	26
	Ditto	dep.	4	2	8	36
293½	BAREJREE*	arr.	4	25	8	57
	Ditto	dep.	4	[illegible]	9	2
306	**Ahmedabad**	arr.	5	0	9	30

UP TRAINS.

Miles.	Stations.		Time. Passenger h.	m.	Goods h.	m.
			A.	M.	A.	M.
	Ahmedabad*	dep.	7	0	8	0
10½	BAREJREE	arr.	7	29	8	[illegible]
	Ditto	dep.	7	35	8	[illegible]
17½	MEMDABAD	arr.	7	43	8	43
	Ditto	dep.	8	4	9	5
28	NERIAD	arr.	8	23	9	34
	Ditto	dep.	8	43	9	48
40½	ANUND	arr.	9	10	10	9
	Ditto	dep.	9	24	10	27
47½	WASSUD*	arr.	9	41	10	47
	Ditto	dep.	9	56	11	15
61½	**Baroda**	arr.	10	36	11	35
					12	0
					A.	M.
	Ditto	dep.	10	46	6	9
73½	ETOLA	arr.	11	21	6	34
	Ditto	dep.	11	31	6	51
[illegible]	MEAGAUM	arr.	11	55	7	13
			P.	M.		
	Ditto	dep.	12	[illegible]		
90	PALLEJ	arr.	12	22	7	28
	Ditto	dep.	12	27	7	51
[illegible]	CHUMARGAUM	arr.	12	41	8	1
	Ditto	dep.	12	51	8	27
106½	**Broach**	arr.	1	18	8	37
					9	0
	Ditto	dep.	1	28		
	NERBUDDA FERRY	arr.	P.	M.		
	Ditto	dep.	2	5	P.	M.
111½	UNKLESUR*	arr.	3	1	12	20
	Ditto	dep.	3	14	12	[illegible]
[illegible]	PANOLEE	arr.	3	25	1	[illegible]
	Ditto	dep.	3	40	1	50
[illegible]	KLEM	arr.	4	3	2	0
	Ditto	dep.	4	8	2	24
[illegible]	SION	arr.	4	26	2	39
	Ditto	dep.	4	31	2	50
[illegible]	AMROLEE	arr.	4	47	3	4
	Ditto	dep.	4	52	3	24
142½	**Surat**	arr.	5	0	3	34
					3	44
			A.	M.		
	Ditto	dep.	7	20	3	59
151½	SUCHEEN	arr.	7	45	4	20
	Ditto	dep.	7	54	4	38
161½	NOWSAREE	arr.	8	25	5	4
	Ditto	dep.	8	35	5	16
170½	UMULSAR	arr.	9	0	5	41
	Ditto	dep.	9	7	5	51
173	BULEMORA	arr.	9	19	5	59
	Ditto	dep.	9	23	6	9
180½	BOONSREE	arr.	9	45	6	29
	Ditto	dep.	9	50	6	35
185½	BULSAR	arr.	10	10	6	50
	Ditto	dep.	10	20		
192½	PARDEE	arr.	10	13		
	Ditto	dep.	10	18		
201½	DAMUN ROAD	arr.	11	20		
	Ditto	dep.	11	30		
215½	SUNJAN	arr.	12	15		
	Ditto	dep.	12	20		
231½	DHANOO ROAD	arr.	1	7		
	Ditto	dep.	1	17		
245	BYSUR	arr.	1	57		
	Ditto	dep.	2	2		
262	PALOUCE	arr.	2	22		
	Ditto	dep.	2	28		
276½	BASSEIN ROAD	arr.	3	23		
	Ditto	dep.	3	45		
297½	BANDORA	arr.	5	2		
	Ditto	dep.	5	9		
300½	MAHIM*	arr.	5	10		
	Ditto	dep.	5	15		
306	**Grant Road.**	arr.	5	25		

The DOWN PASSENGER TRAIN from Bombay will cross the UP PASSENGER TRAIN from Surat at SUNJAN and the UP GOODS TRAIN from Ahmedabad at SUCHEEN.

The DOWN PASSENGER TRAIN from Broach will cross the UP PASSENGER TRAIN from Ahmedabad at MEAGAUM.

The UP PASSENGER TRAIN from Surat will cross the DOWN GOODS TRAIN from Bulsar at NOWSAREE.

The Crossing Stations are underlined.

Tickets will be examined by Passengers Trains at the Stations thus * Marked.

The speed of running over the Iron bridges is calculated at the rate of ten miles an hour.

MAHIM JUNCTION.—For the present All Up and Down Trains to stop dead before passing over the crossing and not to move on until a special all right signal is given by the signalman in charge of the Branch.

G. N. ANDERSON,
Locomotive Superintendent

J. B. HAYES,
Traffic Manager.

Annexure 20-F

Derailment of PM Down Express Mail Train on the morning of 6 December 1857 at Mugra station on East Indian Railway.

1. Telegram dated 6-12-57 reporting the accident from Driver M. G. Brotherhood of Engine No. 20 "Napoleon" to Locomotive Superintendent, Howrah.

2. Detailed report dated 7-12-1957 from Loco Inspector to Locomotive Superintendent, Howrah under different parts, Damages, Brake van, the Road, the Points etc.

3. Report dated 8-12-57 from Resident Engineer, Howrah to Chief Engineer EIR giving the result of his enquiries and the cause of the accident, that the facing points were not secured (notwithstanding the assertion of the station master and the pointsman to the contrary).

4. Report dated 9-12-1857 to the Agent Edward Palmer, from Traffic Manager regarding the accident and relief measures. The report inter alia, refers to instructions dated 13 April 1856 to all station masters from Traffic Manager, M. D. M. Roche, regarding the normal position of facing points with instructions that they should be locked every evening after departure of the last train and further instructions dated 8 August 1857, repeating earlier instructions and enjoining station masters to visit the pointsmen before the arrival of each train and collect the key of the points at the end of the day.

5. From Chief Engineer EIR George Turball to Agent E. I. R. dated 9 December 1857 giving cause of the accident ; facing points not having been locked.

6. From Traffic Manager to Agent, dated 15-12-1857, informing him that Howrah Magistrate had fined the station master Rs 50, being 2 months' pay for neglect of duty.

7. Detailed Report dated 28-12-1857 from Agent E. I. R. to the Consulting Engineer to Government with diagrams and sketches holding the driver responsible for passing the points at high speed (20 m p h) and the station master for failure to lock the points.

Excerpts from this Report "Re the award of the Howrah magistrate of a fine of 2 months' pay on the Station Master, that award he stated to me would have been much more severe but for special reasons, namely, the good character given the defendent by Mr Chamon who prosecuted at the instance of the Railway Company and who did not press for a severe punishment. This fact the magistrate would have been glad should have

been noticed in the printed "caution" to Railway servants signed by Mr Case copy of which is annexed.

Mr Case states that he should have published this fact but feared the resignation of Station Masters in a body, leaving their posts and sacrificing their pay, which I believe is the only penalty they would suffer.

All danger of inconvenience to the public from any such combined action, which, however, I do not anticipate, may be prevented by special written contract which I have directed may be arranged for in future with SMs."

21

The Personnel Department

In the middle of the nineteenth century, the staffing of railways in India, owned and managed by British companies, was made on the basis of racial discrimination. There were wide disparities between the salaries of the British and the Indian personnel which were not warranted by the nature of their duties, but were a clear case of differentials based on colour and race. After over a century of British domination during which Indian trade and handicrafts had suffered much damage, Indians had become economically weak and dependent upon the British for their livelihood. So it was easy for railway companies to hire workers cheaply and retain them at low salaries.

Some typical salaries and allowances that prevailed during the first railway decade in India are given here :

Locomotive driver-cum-foreman (European)	Rs. 300 p. m.	1853
Deputy Consulting Engineer to Government of India (European)	Rs. 600 p. m.	1854
Clerk of Works (European)	Rs. 300+Rs. 30 horse allowance p. m.	1854
Consulting Engineer to Government of Bombay (European)	Rs. 1840+500 p. m.	1855
Horse and buggy allowance to an engineer in Burdwan (European)	Rs. 45 p. m.	1852
Station Master (Indian)	Rs. 25 p. m.	1857
Mistry (Indian)	Rs. 35 p. m.	1857
Agent Calcutta and South-Eastern Railway (European)	£ 600 p. a.	1859
Chief Clerk (European)	Rs. 600 p. m.	1860

But these disparities must be viewed in the light of the fact that the number of Europeans employed on the Indian Railways was never very large. The following table shows the number of servants employed of the different races, Europeans and Indians, who were then described as natives, at the turn of the century :

Year	Europeans	Eurasians	Natives	Total
1897	4,793	6,902	284,800	296,495
1898	4,967	6,936	296,700	308,603
1899	5,292	7,393	329,089	341,774
1900	5,229	7,364	337,383	349.976
1901	5,489	8,182	356,766	370,437

Recruitment

During the nineteenth century and well into the twentieth, recruitment to the superior cadres was made in England and to the inferior categories by local administrations. Responsibility for recruitment of non-gazetted staff to an agency independent of the railways was transferred just a year before the partition of the country. Railway Service Commissions were constituted and started functioning at Calcutta and Bombay in April 1947 and at Lucknow from October 1947. Gradually, the number of such service commissions has increased, some of which function at Allahabad, Bombay, Calcutta, Madras, Bangalore, Danapur, Gauhati, Muzzaffarpur and Secunderabad. Unskilled workers, such as porters and gangmen, are recruited locally on the divisions.

Before the formalisation of the recruitment procedure, children of railway employees used to be shown some preference in recruitment to the lower cadres of the service, on the principle that such preference fosters loyalty to the organisation, and in the long run, helps in developing a family relationship between the management and the employees. This postulate was widely accepted and the Railway Accident Committee 1962 recommended that the constitution should be amended to revive this practice. But on the principle of equal opportunity for all citizens enshrined in the Indian constitution, preference to employees' children has not been accepted.

Indianisation

There was a definite attempt on the part of the British railway companies in England to build up a permanent settlement of skilled European labour in India. In the case of Inspectors Moss and Allen

who were murdered during the disturbances of 1857, the East Indian Railway Board wrote to the Secretary of State as follows :

> "With regard to the more general question of the principle to be observed in any further cases, the Board consider it desirable to hold out any reasonable inducements to their employees to look upon India as their home—this is scarcely possible while the men leave their families here and the Board are of the opinion that their agreeing to grant free passage home to the families of the men who from no impropriety of conduct are suddenly deprived of life would encourage the men to take their wives and families out—would create a more willing disposition on the part of the latter to go than at present exist—would conduce to the steadiness and the sobriety of the men—and would lend to effect in the course of time that which the railway works in India so much demand, something like a permanent settlement of skilled European labour in the country."

The manner in which the superior staff was divided in terms of European and Indian personnel in earlier years is appropriately summed up in the following words of the Acworth Committee (1920-21) :

> "At the date of the last report there were employed on the railways of India about 710,000 persons. Of these, roughly 700,000 were Indians and only 7,000 Europeans, a proportion of just one per cent. But the 7,000 were like a thin film of oil on the top of a glass of water, resting upon but hardly mixing with the 700,000 below. None of the highest posts are occupied by Indians, very few even of higher. The position of a District Engineer, District Traffic Superintendent, or of an Assistant Auditor is, with one or two exceptions, the highest which Indians have hitherto attained. The detailed figures......show that on the principal railways of the country out of 1,749 posts classed as superior, 182 or rather more than ten per cent are filled by Indians. Of the 182 Indians, 158 occupy posts as Assistant District Officers in the various departments, 24 have reached the higher grade of District Officers. That they have not been advanced to higher posts, that even in the subordinate posts of the official staff there are not more of them, has been a standing subject of complaint before us."

As a result of the recommendations of the Acworth Committee and in response to strong public opinion expressed in the legislature, better training facilities were progressively made available to Indians and increasingly greater numbers of Indians were admitted to higher posts. An Indian was taken as Member of the Railway Board and a few Indians rose

to positions of Deputy Commercial Managers, Commercial Managers, Deputy Agents and Agents. A few others rose to higher posts in the technical departments. Even then, up to the time of India's independence most of the positions in the higher cadres remained a European preserve. The Europeans enjoyed besides salaries, gratuities, allowances, bonuses, leave facilities, and home leave allowances, several other amenities, which according to British opinion were just adequate to attract suitable candidates from Britain, but according to Indian opinion represented a heavy drain on the resources of Indian Railways.

In the lower services also distinct preference was shown for Europeans and Anglo-Indians. They were paid better salaries and were allowed better amenities and privileges than Indians doing the same work. Europeans and Anglo-Indians lived in separate colonies in railway towns and were provided with superior type of quarters. Special arrangements were made for the education of their children. Separate institutions and clubs were reserved for their entertainment and relaxation, and even separate provision was made for medical services. All these distinctions disappeared after 1947. Merit alone determined a person's fitness for a particular job. Recruitment to the Superior Establishment is made by the Union Public Service Commission through open competitive examinations.

Training

There is some evidence of consciousness on the part of the Court of Directors in London who supervised the working of the railways in India, that Indians should be given opportunities to fill places which had been the exclusive preserve of Europeans during the first railway decade. In a despatch sent in 1855, the Court directed the Governor-General of India :

> "The scheme of training native drivers is very desirable, not only for the purpose of rendering the railway company independent of European Railway drivers, but also for carrying out the principle of employing native labour wherever practicable."

Again in 1860, the Secretary of State wrote to the Governor-General-in Council that he approved of the establishment of workshop schools in India for training men of the traffic department, especially as engine drivers. He said : "I trust before long Natives (Indians) may be found equal to the duties of many of the situations in that department."

Training institutions on the Indian Railways may be divided into two broad categories : those that serve the needs of the entire system and those that cater to the requirements of the zonal railways. The premier institu-

tion in the first category is the Railway Staff College, Vadodara which provides instructions and training for gazetted officers. It was opened in 1952 and has certain broad-based courses which are attended by all probationary officers. In addition, it also offers a number of advanced and specialised courses, covering such subjects as modern management, work study, public relations, marketing and sales, computer science for both executive and administrative officers.

At Jamalpur, there is the Indian Railways School of Mechanical and Electrical Engineering which was established in the 1880s. It trains apprentice mechanical and electrical engineers, who are appointed as officers in those departments. Previously, all mechanical officers were trained at this school, but later Indian Railways began recruiting graduates in mechanical engineering by direct appointment. The Indian Railways school of Signal Engineering and Tele-communication, Secunderabad, established in 1957, trains signals and communication engineers both in the gazetted and non-gazetted ranks. The Indian Railways school of Advance Permanent Way Engineering, Poona established in 1959, imparts higher technical training in permanent way to the officers of the civil engineering department of the Indian Railways and countries like Burma, Ceylon, East Africa, Nigeria, Sweden and Thailand. In 1971 it was renamed Indian Railways Institute of Advanced Track Technology.

Zonal Railways have training schools for non-gazetted employees. The scope of training at these institutions varies from railway to railway, but they generally provide initial courses for fresh recruits and refresher and promotion courses for those already in service. Instruction usually covers subjects relating to transportation, commercial, permanent-way, works and storekeeping. These schools have recently introduced courses in modern management, statistics, welfare, cooperation and safety for senior supervisors, who function as junior managers and provide a link between the management and the employees. On some railways, gazetted officers receive initial training at these schools.

Othe training institutions on zonal railways, include schools for initial and refresher training in mechanical and electrical trades, to both static and train working staff, basic training centres in workshops for training artisans, and area training schools at divisional headquarters and other important places, for the training of unskilled workers of the traffic and locomotive departments.

Training arrangements on Indian Railways cover employees of all trades and all ranks, at suitable institutions, as well as on the job, on the shop floor, the locomotive footplate, the track and the signal cabin. Initial training is followed by refresher and promotion courses. The skill of an

employee is upgraded periodically, by giving him higher training and exposing him to advanced techniques. The Railway Board recognize the value of railwaymen visiting areas and establishments, where special operating conditions obtain, or new ideas have fructified.

Gazetted officers and senior supervisors are sent to more developed countries to broaden their knowledge and study new and successful methodology. It is recognised that not only senior managerial personnel, but also top management, can benefit from observation and study of railway working in other countries. Such studies have helped Indian Railways to make advances in technology since the 1960s.

To encourage railway employees to apply their mind to improve the working of the railways, the management offers monetary awards for innovations and suggestions. These are considered by Standing Screening Committees at the divisional and zonal headquarters levels, and those found to be of practical value are accepted and suitably rewarded. In case of exceptionally useful ideas, rewards may take the form of an advance increment or grants for studies.

Origin of the Personnel Department

In railway parlance in India, the personnel factor is of recent origin. Even the word 'establishment' was not in vogue till the 1920s. In the Index of Proceedings of the Railway Board for 1922, there is no mention of such a branch as 'establishment', which does figure in the 1925 index. In this also, there is no such entry as 'personnel'. Apparently, the establishment was recognised as a separate entity sometimes between 1922 and 1925.

In Chapter Sixteen, the evolution and organisation of the divisional system was explained in some detail. With the changeover from the district to the divisional system, a separate Personnel Department was formed on the Indian Railways. Under the district system, the district officer was responsible for attending to establishment work relating to the employees working in his department. As the scope of railway work expanded, resulting in an increase, first, in the number of employees, and second in the volume of legal enactments, such as the Factories Act, the Hours of Employment Regulations and Payment of Wages Act, and the labour welfare services, it became necessarry to have a separate cadre of personnel officers who could relieve executive officers of routine personnel work to enable them to concentrate on their technical duties. Under the divisional system, therefore, the Divisional Railway Manager is assisted, among others, by a Divisional Personnel Officer. At the zonal Head-

quarters, the General Manager is assisted by a Chief Personnel Officer, earlier designated as Deputy General Manager (Personnel). The Chief Personnel Officer functions like other Heads of Departments, and deals with all personnel matters including recruitment, training, promotions, welfare and labour relations. At the Railway Board level, there is a full-fledged Member (Staff) assisted by more than one Director, Establishment.

Scale of Salaries

The numerous administrations that came into being, and the variety of organisations which they adopted in the development of Indian Railways, naturally resulted in hundreds of different scales of pay. Thus salaries and allowances for identical or similar jobs varied widely from railway to railway. In 1947, the Government appointed a Central Pay Commission, which recommended standardization of scales of salaries on evaluation of jobs. The number of scales was reduced to 30 and compensatory and house rent allowances were standardized. Leave rules were liberalised for permanent staff and temporary staff with more than one year's service also became eligible for regular leave.

In the case of gazetted officers also, there was a general revision of salaries. Scales of pay of gazetted officers had been revised in 1935 so as to prescribe emoluments more in keeping with the Indian economic conditions. Due to the fast pace of Indianisation, the British element was slowly disappearing from the railway services and there was no longer any justification for maintaining the higher scales that were necessary to attract foreigners. The scaling down in 1935 was, however, so drastic that the starting pay of a gazetted officer, on joining service as a probationer, was prescribed at Rs. 250 per month, rising by an increment of Rs. 25 per annum to Rs. 300 per month, when he took independent charge of a post. The pay of an officer of district or divisional rank was fixed at Rs. 750, with a provision for some posts to be operated at Rs. 850 and Rs. 950. The highest salary prescribed was Rs. 3,000 for a Member of the Railway Board, equivalent to a Secretary to Government. Under these prescribed scales, an officer had to put in ten to fifteen years' service, before he could draw Rs. 750 per month. The 1947 Pay Commission liberalised the scales of pays for gazetted officers also. Since 1947, there have been several revisions of the scales of salaries of railway employees, both gazetted and non-gazetted, on the recommendations of subsequent pay commissions, by the process of adjudication and by means of administrative action by the Railway Board.

Provident Fund

A Provident Fund, the object of which is to make some provision for employees against their retirement or for their families in the event of their dying while still in the service of the railways, was created at the turn of the century. The Report of the Indian Railways for the year 1901 recorded : "The money in this fund cannot be attached by courts of law, nor can it be alienated or hypothecated by the employee. Every monthly paid employee, who is neither pensionable nor a menial servant, is obliged to be a member of this fund and is required to subscribe monthly amounts varying on different railways but not exceeding 1/12th of his salary. At the close of the half-year, the railway distributes as bonus among the depositors a first contribution equal to one-half of such subscriptions, and a second contribution, if the earnings permit of this being done, not exceeding one-half of such subscriptions or one per cent of net earnings. In the case of the more prosperous railways, the double contribution is now generally obtained by depositors. The amount thus subscribed amounted at the end of 1901 to nearly 378 lakhs of rupees, the bonus paid by railways amounting to nearly 87 lakhs" Later, the terms of Government contribution were modified and the railway administration contributed every month an amount equal to the employees' contribution. At the time of retirement, an employee also received special contribution to the provident fund, for good and efficient service. The system suffered from the shortcoming that on retirement many employees spent the entire sum that they had received as retirement benefits, on social obligations; and some others entered into unprofitable business ventures, which left the family destitute. To remedy this situation, Government introduced a pension scheme for railwaymen and created a Pension Fund in 1964.

Staff Welfare

Staff welfare measures can be classified into two groups :

(b) Those required by statutes, and

(b) Those which pertain to social welfare.

Welfare measures required by statutes are obligatory. But the social welfare measures cover programmes which have their basis on voluntary participation of railwaymen and the administration. We shall first deal with important legislative measures.

Of the mass of labour legislation that was enacted in the process of liberalization following World War I, three important measures, which substantially improved the environment in which railwaymen worked,

deserve mention. First was the Workmen's Compensation Act of 1923, which provided for adequate compensation to workmen for injuries caused by accidents, arising out of and in the course of their employment. Under the Act, compensation is payable to workmen, except when injury is caused by an employee's own fault, e. g., when he is under the influence of liquor, or has deliberately disobeyed an order or a rule framed for the purpose of securing the safety of workmen, or has wilfully removed or disregarded any safety device. In the interpretation of this Act, Indian courts have been considerate to railway employees, so much so that a man who was murdered on the road while on his way to his place of work, was awarded compensation, the court having taken the view that if the employee had not have been proceeding to his place of duty, he would not have been at that particular time, at the place where he was killed, and, therefore, the accident of his death arose out of his employment.

The second measure was the promulgation of the Hours of Employment Rules in 1931, which regulated the hours of work of railwaymen and prescribed periods of rest, including a weekly rest, in accordance with certain universally accepted conventions. The International Labour Organisation was created by Part XIII of the Treaty of Versailles and the first conference of this body was held in Washington in 1919. At the conference, the Hours of Work (Washington) Convention was adopted and this Convention was ratified by the Government of India in July 1921. The Weekly Rest (Geneva) Convention was adopted at the Conference held at Geneva in 1921 and was ratified by the Government of India in July 1923.

As far back as September 1921, the Railway Board addressed all Railway Administrations with regard to the applications of the Washington Convention to workshop staff and station staff unconnected with the working of trains, and in 1922 and 1923 the Board was in communication with Agents regarding the general application of the Geneva Convention. In the meantime, amendments to the Factories Act (1911), which were made in 1922 and 1923 brought that Act into conformity with the provisions of the two Conventions so that these classes of railway servants to whom this Act applies—mostly workshop staff—were brought under statutory regulations complying with both conventions.

Until then very little difficulty had been experienced in complying with this new legislation as far as railways were concerned, as there were few, if any, workshops in which the weekly hours of work exceeded 60, while all shops were closed on Sundays, so that employees already enjoyed the stipulated weekly rest. It soon became apparent, however, that the fulfilment of the obligations which the Government of India had taken upon themselves in ratifying the two Conventions would present certain difficulties with regard to railway servants other than workshop employees.

These difficulties were not peculiar to India. It was realised that executive orders would not be sufficient to fulfil the obligations of Government and that legislation would be imperative. A short Bill was, therefore, introduced in the Legislative Assembly in September 1929. The amended Bill was passed in the Legislative Assembly on 27 February 1930 and in the Council of State on 19 March. The Bill became law as the Indian Railways (Amendment) Act XIV of 1930. The act was regarded as an important milestone in the humanising of the conditions of work of railway employees of all classes.

Rajadhyaksha Award

Some modifications in the hours of employment of the employees were made with the enactment of the Indian Railways (Amendment) Act, 1956. In respect of the duty hours of running staff, the provisions of this Act were amplified by the Award of the Adjudicator, Mr. Justice G. S. Rajadhyaksha. He had recommended that, in the case of running staff, their running duty at a stretch should not ordinarily exceed ten hours and that they should be entitled to claim relief after twelve hours, provided they had given two hours' notice to the controller, and that for the purpose of computing duty at a stretch, time should be calculated from the actual departure of a train.

The third measure was the Payment of Wages Act 1935, which provided for the regular payment of wages, and regulated deductions to certain items such as fines, cuts for absence from duty, loss or damage to railway property, and fees for amenities and services. The purpose of limiting deductions was to ensure that an employee be left with sufficient take-home money to meet his reasonable needs. The task of arranging payment of wages strictly on schedule, at the end of a wage period to more than 1.5 million men, under the Act, scattered in small lots, all along the line, bristled with numerous difficulties. The railway management, to fulfil this commitment had to stagger wage-periods, press into service all types of transport, motor cars to push trollies, and give armed protection to cashiers who had to reach some remote places.

As to measures other than those required by statutes, facilities provided by the railway administration range from rest shelters and means of recreation to sanitation, medical aid, travel arrangements to and from work, maternity and child welfare, and educational institutions. There is a separate welfare organisation within the overall framework of the personnel department. The Welfare branch is responsible for the implementation and follow up of various directives given by the administration for the

redressal of staff grievances. It is within the ambit of these principles that the welfare of the employees has grown ever since the inception of the Railways. With the meagre provision of recreational facilities and schools set up in the early days to cater for the requirements of European and Eurasians, such amenities have gradually expanded to provide for all sections of staff.

Schools

On the larger railways, schools were provided and maintained at all centres where the number of children was large enough to justify the employment of the teaching staff. The fees charged were graduated so as not to press too heavily on the poorer employees. The Report of the Railway Board on Indian Railways for 1901 states : "Government in the Education Department allow a certain grant for every child who passed the tests prescribed and any deficit is made from the revenues of the railway or from the Fine Fund. Where the number of employees is not large enough to justify the provision of a railway school, and there already exists a public or private school in the town, the schooling fees are borne wholly or in part by the railway. The number attending school amounted, at the close of 1901, to 5,377 children and 3,581 apprentices and workmen, the contributions by Government amounting to Rs 35,601 : by the railways to Rs. 1,34,447 and by fees to Rs. 1,33,971. The assistance thus given to employees is much appreciated, and a proper standard of education is ensured by the examinations which is conducted yearly by the Government Inspectors of Schools before the grant can be drawn."

Though education is primarily the responsibility of state governments, schools and colleges are opened at locations where such facilities are not adequate or are non-existent. Grants-in-aids are also extended to privately managed schools which cater to the needs of the wards of railway employees. Subsidised hostel accommodation has been provided in major linguistic areas, so that the staff who are posted away from the headquarters can send their children for studies to these places. Reimbursement of tuition fees for children of railway employees studying upto higher secondary stage leading to a three-year degree course is yet another welfare measure.

Housing

Till the close of the nineteenth century, there was no clear-cut policy in regard to the provision of housing to railway employees. It was generally

limited to gazetted officers and European and Eurasian staff. A proper assessment of the needs for housing for different categories of railway staff was made by a Housing (Mitra) Committee which reported in 1947. The standard of accommodation recommended by the Mitra Committee for the lowest type of quarters, viz., 'A' for skilled and unskilled workers, consisted of two main rooms each of 12'×10' (3.7m×3. 1m) a kitchen, latrine, etc. The accommodation was almost the same as for the coal miners' houses which were being built by the Ministry of Labour and the type provided by Tatas for their workmen. The other types of quarters, viz B, C, and D, were meant for the various categories of junior and senior subordinates.

The minimum standards of accommodation and amenities were prescribed by the Board for each type of quarter. In the first instance, quarters were provided for essential staff only. The term 'essential' was to be understood in the sense that such staff were liable to be called on duty in emergency or to attend to work at inconvenient hours, and to remain near the site of work, and for whom no private houses were available. Housing accommodation is provided to staff on payment of rents generally at subsidized rates. Programmed construction of houses is undertaken every year. Presently about 38 per cent of staff are housed.

Medical and Health

The practice of doling out medicines to railway employees is practically as old as the Indian Railways. The London Board of a railway company wrote to their Agent in India in July 1859 as follows :

> "Medicines —The Directors observe that with the sanction of the Consulting Engineer you had contracted with Messrs Scott Thompson & Co. for the medicines required for the use of the staff of the company. The Directors do not wish to establish any new Rule with regard to the point and request you will conform to the practice of the EIR Company in this respect. If they allow medicines to these staff, the Board will agree to confirm what you have done in the matter."

In addition, the companies had their own medical officers who examined railway personnel sent from England for working on the Indian railways, in regard to their fitness for service in this country. A despatch dated 25 October 1866 referred to the report of the medical examination of the Scinde Railway Company's Chief Marine Engineer and considered him not fit for service in India.

The Medical Department of the Indian Railways as a separate entity had, however, a different kind of beginning. To start with, medical officers were appointed at some places for attending to the employees and casual labour at the construction sites only. At other places, the railway administrations used to engage civil surgeons for the purpose. The need to conduct pre-employment and periodical medical examination was, however, felt quite early and the railways started employing some doctors of their own to look after this type of work. The railways also found it necessary to provide medical aid to passengers injured in accidents. Some specific studies were made from time to time ; for instance in 1928, a technical paper was produced on malaria as it affected Indian Railways. Even so, till 1947, the Health Department had not taken shape as railway provided for only such treatment free to railwaymen as was available in a particular hospital or dispensary.

After independence, the provision of full and free treatment became a statutory responsibility and the Railways gradually developed their own institutions. These institutions had a three-tier structure. At the Railway Board level a Health Department was set up, firstly under the charge of an Officer on Special Duty (Medical), a post which was later upgraded to that of Director and still later into a full-fledged Director General, equivalent to an Additional Member's rank. The second tier consisted of the Chief Medical Officers of the zonal railways and production units. Under them was the third tier at the level of divisions with several Divisional Medical Officers and Assistant Medical Officers.

In 1950-51, there were 71 hospitals and 145 health units on the Indian Railways, with 2435 beds and during the following thirty-four years, these numbers have increased to 107 hospitals, 623 health units and 12088 beds. The total cost of the services increased from Rs. 2.7 crores in 1951 to Rs. 81 crores in 1985, a quantum jump indeed.

Other Amenities

Clubs and institutes were established on the Indian Railways soon after a viable network had taken shape. These were to begin with, primarily for the benefit of Anglo-Indian and Eurasian staff, but after Independence they were thrown open to all employees. Some of these early institutions at such important stations as Jamalpur, Howrah, Allahabad and Bombay had developed into great centres of entertainment, not only for the railway staff but also for outsiders. Rudyard Kipling wrote in 1888 :

> "Best and prettiest of the many good and pretty things in Jamalpur is the institute on a Saturday when the Volunteer band is

> playing and the tennis courts are full and the babydom of Jamalpur—fat, sturdy children—frolic round the bandstand. The people dance......they act, they play billiards, they study their newspapers, they play cards, everything else. They flirt in a sumptuous building and in hot weather, the gallant apprentice ducks his friend in the swimming bath. Decidedly the railway folk make their lives pleasant."

While amenities provided in railway clubs and institutes have undergone a vast change to suit the requirements of the employees, their number has increased progressively. There are now 841 institutes, reading rooms and recreational clubs for promoting espirit-de-corps among railway employees and encouraging them to participate in sports and games. Thirty three holiday homes have been set up at selected hill stations (including Pahalgam and Srinagar) and seaside resorts, where staff can spend their holidays inexpensively with reasonable comfort. To supply cheap and wholesome food near the place of work on a no-profit no-loss basis, the railways subsidise staff canteens.

Co-operatives

A number of co-operative stores, which catered to the daily requirements of the employees living in railway colonies, flourished before 1947. They were very popular as railwaymen could buy groceries and similar articles at rates considerably lower than the market. There were also credit societies, the capital base of which ran into crores of rupees. In 1960-61, there were 26 co-operative credit societies of railway employees. The total membership at the end of the year was 6,48,087. The paid-up share capital of these societies was Rs. 463.24 lakhs. Nearly 58 per cent of the railwaymen were members of these societies. The average share capital paid by them amounted to Rs 71 per head.

Sports

From the small beginnings as a part of the recreational facilities at the European Institutes in the early years of the twentieth century, sports activities on the Indian Railways have expanded so as to cover all classes of railway employees and all large stations where there is a concentration of railwaymen. Regular tournaments in major games such as football and hockey and athletic meets are held and railway teams participate in the national sports events.

22

Industrial Relations

In the days of the company railways, the fact of certain line posts in the traffic departments, such as station masters and pointsmen being manned exclusively by Indians did create among them a sense of solidarity, which made their English bosses wary of concerted action by the station staff. Though there were no organised trade unions, there is evidence that the possibility of the staff acting in concert, such as resigning their jobs *en masse,* was recognised by the railway administration in the middle years of the nineteenth century.

Sporadic Labour Unrest

Occasional labour unrest made its appearance on the Indian railways from time to time and practically all over the network so much so that in 1906 and subsequent years a provision to add imprisonment to the punishment, to which certain railway employees were liable should be made for voluntary withdrawal from duty without permission or due notice, to the Indian Railways Act of 1890, was considered.

It would suffice here to quote one or two examples of strikes that took place in the early years of the twentieth century. There was a strike of the staff of Loco and traffic departments in November 1907 on the EIR and rewards were given to staff who did extra work. In the same year there was also a strike on the Eastern Bengal Railway. A Board of Conciliation was, therefore, appointed in 1908.

The Motives for Strikes

Indian railway workers began to assert their trade union rights in an organised fashion after the 1914-18 War. Shortages of consumer goods and a spurt in prices caused serious hardship to the fixed income, salaried government servants. Railwaymen were able to obtain some concessions, like subsidised foodgrains and a substantial increase in their wages and allowances. But as that was not enough, workers' unions sprang up in areas where employees were concentrated such as large workshops. Slowly, as normalcy returned after the end of the hostilities, and wartime restrictions on labour were removed, the number of unions and their membership increased. Workers began to assert themselves and to exercise their right of collective bargaining.

The earliest strikes on Indian Railways were promoted by mixed motives : the workers' struggle to improve their economic condition and to register their protest against an alien rule. In 1921-22, there was a wave of strikes, lasting from 1 to 90 days. About 7,000 men of the Liluah Carriage and Wagon Shops were on strike for several weeks leading to riots at Howrah station in February 1922. Workers resorted to these strikes not purely from the motive of forcing railway management to give them higher wages and better working conditions, but also to give expression to the national upsurge against a system, which had been largely exploited to serve the political ends of a foreign power. The first articulation of the railway workers' physical distress and emotional discontent was the formation in 1923, of the All India Railwaymen's Federation, to which a dozen unions, with a membership of about 2,00,000 were affiliated.

There were strikes by the Loco staff of the GIP at Agra and workshop staff of Rohilkhand and Kumaon at Izatnagar in March 1921, the Indian Loco running staff on the EIR at Jharia in January 1922, the English workshop staff of the Madras and Southern Mahratta at Arkonam in September 1922 and by the Loco and Carriage and Wagon men of the Oudh and Rohilkhand in June 1922. Questions regarding these strikes were put in the Council of State and the Legislative Assembly. There was also a threatened strike on the Oudh and Rohilkhand Railway on economic grounds, that is salaries in the case of low paid staff were insufficient. Quazi Mohd. Ismail made a request for help to obtain a "Fatwa" for the prevention of strikes, that is excommunication of Mohamedans who participated in strikes or gave monetary help to strikers. One A.M. Sterling made a suggestion in March 1922 regarding the appointment on railway companies of a Director in India to be elected by the railway staff with a view to minimise labour troubles by safegarding their interests. This was

for those times a revolutionary measure and was, therefore, not seriously considered. Bonus was paid to certain employees of the Kancharapara workshop, EBR, who "remained loyal and worked under great difficulties" and in several other cases, e.g., GIP railway staff in 1930. At other places free meals were given to loyal staff, e.g., during the strike of firemen at Parel on the BB & CI railway in 1921.

The Unions

In the papers of the Railway Board for the 1920s, there is no such entry as 'unions', but by 1930, unions had been established on a number of railways, BB & CI, EIR, GIP & SM, Mysore and NWR. The All India Railwaymen's Federation was, in existence and Mr. V. V. Giri, General Secretary, who later became President of India, made a representation against the prohibition of his entry into Mysore in 1931 for the purpose of helping the Mysore Railway employees to organise themselves.

Recognised railway trade unions in India were affiliated to two federations at the national level, the National Federation of Indian Railwaymen and the All India Railwaymen's Federation. Both the Federations had political links, the NFIR being associated with the Indian National Congress and the AIRF with the Communist Party of India, as these parties functioned before the split of the Congress in 1969-70. There were some signs of split among the apex trade union bodies also, for instance, the Indian National Trade Union Congress displayed a tendency towards polarisation on the same lines as the Indian National Congress, under whose aegis it functioned. Since the trade unions drew their inspiration from political sources, their functioning as trade unions was coloured by political overtones.

In addition to the recognised unions, Indian Railways had at one time established Staff Councils, as a part of the machinery to maintain liaison with labour and to promote understanding between the management and the employees. These Councils, which had 50 per cent elected members and 50 per cent nominated by the administration, were a kind of foil to the recognised unions, and after a few years they were dominated by the same elements as were active in the recognised unions. As they had lost their utility, the Staff Councils were abolished in 1967 except in the three production units—Chittaranjan Locomotive Works, Chittaranjan, Diesel Locomotive Works, Varanasi and Integral Coach Factory, Perambur.

Permanent Negotiating Machinery

Joint Committees consisting of representative of the administration and senior supervisors drawn from various departments, were set up soon after 1967 to handle questions relating to efficiency and safety of the travelling public. The subjects discussed by these Committees covered a wide range, such as safety devices on passenger coaches, maintenance of cleanliness at stations, punctual starting of trains, economy in consumption of fuel and elimination of accidents. Though joint committees did not deal with labour welfare, they provided a forum for the representatives of labour to raise such matters concerning the well-being of workers as would improve their performance. In 1952, an agreement was reached between the Government and labour interests on setting up a standing organisation to settle disputes between the railway management and the recognised unions and to maintain day-to-day contact with labour. The Permanent Negotiating Machinery thus came into being. Since the recognised unions and the Permanent Negotiating Machinery were found to be more effective in respect of labour relations, the joint committees gradually receded into the background.

The Permanent Negotiating Machinery functions at three levels. The lowest level is on the divisions, where the Head of a Division holds periodical meetings separately with the executive committees of the recognised unions. Here local problems are discussed and an attempt made to hammer out solutions. The divisional head is assisted by his divisional officers at these meetings, but he banks mainly on his Divisional Personnel Officer, who has his finger on the pulse of the workers on the Division through frequent contacts with the office-bearers.

Next to the divisional level, the Permanent Negotiating Machinery functions at the zonal level where meetings are held between the General Manager, assisted by his Chief Personnel Officer and other Heads of Departments, and the President of the zonal union who is accompanied by the office-bearers and members of his executive Committee. At the zonal meetings, unions raise problems which are beyond the competence of a Divisional head, or which have not been resolved satisfactorily at the lower level. Similarly, meetings are held between the Railway Board and the national federations to discuss matters of high policy concerning labour and specific matters on which agreement could not be reached at the zonal level. In a normal year, that is, when recognition is not withdrawn from a union or a federation on such grounds as an illegal strike, about 1,000 meetings of the Permanent Negotiating Machinery are held at the divisional, zonal and the Railway Board levels.

The trade unions on the Indian Railways may have outsiders, who

are not employees, as their Presidents and Secretaries. They are generally persons of some standing in the trade union movement with considerable experience of labour problems. For instance, Miss Maniben Kara, who was the President of the Western Railway Employees' Union, affiliated to the All India Railwaymen's Federation in the late 1960s, was a sober and seasoned bargainer at the meetings of the Permanent Negotiating Machinery. She would not only represent the workers' point of view forcefully, but would also courageously counsel them to be reasonable, if they pitched their demands too high.

There is usually a heavy agenda, covering a wide range of subjects, for the Permanent Negotiating Machinery meetings. Rationalisation schemes launched by the railway administration, mechanical condition of locomotives, working hours of running staff, classification of a group of men as continuous or intermittent workers, night working allowance, sanction of increments, fixation of pay of men opting for a revised scale of pay, grant of leave, relationship between supervisors and labour on the shop floor, adequacy of the number of beds in a hospital, sanitation in housing colonies, and the need for expansion of schooling facilities for employees' children : this is a fairly representative, though by no means an exhaustive list of the subjects that figure at P. N. M. meetings.

It has often been represented by the federations that the Permanent Negotiating Machinery does not function satisfactorily as some zonal administrations do not hold meetings regularly, delay implementation of decisions and give garbled versions of the unions' case to the Board when it is not settled at the zonal level. Another complaint, not so well defined, is that decisions taken at P. N. M. meetings are inspired more by the prestige of the administration, than the merits of a case.

Tribunals and Adjudication

The Permanent Negotiating Machinery scheme, therefore, provides for the setting up of a tribunal to go into important matters on which agreement is not reached between the Railway Board and any one of the recognised federations of railway employees. Tribunals have been set up in recent years as and when found necessary or disputed matters have been referred to adjudication. Reference has already been made in Chapter Twenty-one to the Rajadhyaksha award. The Railway Labour Tribunal 1969, which reviewed the hours of employment, overtime, and periodic rests of railway employees, including running staff, recommended that running duty at a stretch of running staff should not ordinarily exceed 10 hours but

such duty may extend to a maximum of 12 hours provided the appropriate authority had given at least 2 hours' notice before the expiry of 10 hours to the concerned staff that they will be required to perform duty for 2 hours more, provided also that the total hours of duty from signing-on to signing-off did not exceed 14 hours. They had also recommended that the maximum hours should be progressively reduced by half an hour every 2 years from the date of their report till the period of 12 hours was reached, that is at the end of 8 years from the date of the report the maximum period of duty at a stretch from signing-on to signing-off shall not exceed 12 hours.

Joint Consultative Machinery

In 1966, Government of India formulated a scheme for Joint Consultative Machinery and Compulsory Arbitration for Central Government employees, covering all departments of the Central Government including the railways. The declared objectives of the scheme were promotion of harmonious relations and securing of the greatest measure of co-operation between the government and the general body of its employees, with a view to increase the efficiency of the public service. Under the scheme a Joint Council was established at the national level and a Departmental Council for each department. The National Council consisted of 60 members representing the staff, out of which the railways had 26 seats in proportion to their numerical strength. The National Council was headed by the Cabinet Secretary and had 20 representatives on the official side. The Departmental Councils were also constituted on the same basis. The Railway Council was headed by a member of the Railway Board, in charge of staff matters. The Council had six members representing the Board, while the two federations nominated fifteen members each.

In the declaration of joint intent, that was made in 1966, regarding the common approach by the Government of India and the employees' organisations, to work the machinery of joint consultation and compulsory arbitration, it was agreed that a fair trial would be given to the scheme for a minimum period of five years. It was also agreed that the scope of the Councils will include all matters relating to conditions of service and work, welfare of the employees and improvement of efficiency and standards of work. Provision was made for compulsory arbitration, limited to pay and allowances, weekly hours of work and leave. So far as the railways are concerned, J. C. M. did amount to a duplication of the permanent Negotiating Machinery. That was possibly the reason why it operated upto the level of the Railway Board, and was not extended to the zonal railways. The distinct advance that J. C. M. made on P. N. M.

was the provision of compulsory arbitration, instead of ad hoc tribunals, whose recommendations the Railway Board was not bound to accept.

The Joint Consultative Machinery, during the few years of its existence, has been able to resolve some issues. For instance, Government agreed to the merger of a part of dearness allowance with pay, to benefit employees by way of better housing, travel and other allowances, and pension at enhanced rates. Washing allowance and educational assistance by way of re-imbursement of school fees were other gains that accrued to the railway employees from the new machinery.

Industrial Disputes Act

The Industrial Disputes Act of 1947 provided a test of the legality of a strike. It legislated for compulsory arbitration and a conciliation machinery to bring about peaceful settlement of industrial disputes and to avoid strikes. The Act had special rules for employees of public utility services, including Railways. Any strike started without giving 14 days' notice, or during the pendency of conciliation proceedings, and within seven days after the completion of such proceedings, was illegal.

Strikes of several types have taken place on Indian railways since then. Total stoppage of work, regardless of duration, an hour or a month, falls within the definition of a strike. If protest by staying away from work is not effective, workers may resort to a "stay-in-strike", and thus, build up greater pressure by total stoppage of work, combined with shouting of slogans, to intimidate loyal men and prevent them from working. "Work to rule" and "go slow" are other methods of registering protest. Strikes have also taken the form of workers taking "mass leave" or the entire work force in a depot or in a section of the railway "reporting sick" at a pre-arranged hour. Lately there has been an increase in the number of "wildcat" strikes on the railways.

Some major strikes that have taken place on Indian Railways within living memory have brought about important changes in the employee-management relationship. The total strike at the Kharagpur workshops of the South Eastern Railway in 1956 almost completely paralysed train services on that system. Kharagpur has a big concentration of railway workers and is SER's nerve centre. Initially, the strike began in the mechanical workshops and as it continued for a fortnight, it spread to the line staff and immediately affected Howrah-Kharagpur section, where men went on sympathetic strike. The South Eastern Railway administration could not maintain even a semblance of train services. In Howrah area, the tracks were covered with squatting strikers and their sympathisers.

A General Strike

A general strike by all central government employees in 1960, in furtherance of the demand for a needbased wage, was supported by the All India Railwaymen's Federation. The National Federation of Indian Railwaymen did not associate itself with the strike. Elaborate arrangements made by the management helped maintain a minimum of train services on the first day. But large-scale intimidation prevented loyal workers from reporting for work from the second day. The strike had been on for three or four days. but neither the Government, nor the unions, relented. Every day that passed made the maintenance of services more difficult due to the erosion of the morale of the workers in the face of mounting threats from the strike leaders.

The 1960 general strike was, however, withdrawn unconditionally after five days. Though only 16 per cent of railway employees absented themselves from duty, dislocation of train services was quite widespread. Soon after the strike, the Government announced clemency, condoning the break in service. It was a trial of strength between the Government of India and some sections of employees, backed by a political party from the opposition. As the Congress Party was firmly entrenched at the centre and also ruled in the states, its political opponents could not exploit the Central Government employees to shake the ruling party. The Government of India withdrew recognition from the All India Railwaymen's Federation and its affiliated unions, who had participated in the strike, but this was restored 15 months later in September 1961.

A Token Strike

In September, 1968, the All India Railwaymen's Federation and the unions affiliated to it, gave notice of a token strike, in pursuance of a decision taken by some Central Government employees' organisations, that if Government did not concede their demands relating to wages and allowances they would strike for a day on September 19. Government promulgated the Essential Services Maintenance Ordinance, 1968 which made the strike illegal, in spite of due notice having been given as required by the Industrial Disputes Act, 1947. In view of the apprehension of large scale squatting on the track and damage to railway property, as occurred during the 1956 strike on the South Eastern Railway and the general strike in 1960, Government also armed itself with the Indian Railways (Amendment) Ordinance, 1968 making any deliberate attempt on the part of the staff to abandon trains in mid-section or to cause obstruction to movement of traffic

an offence. The two ordinances were later on replaced by Acts of Parliament.

The Western Railway Employees' Union withdrew from the strike, though the call given by the apex body, the All India Railwaymen's Federation stood. Following this lead, some other zonal railway unions also withdrew. Eventually the Central and South Central Railway also dissociated themselves from the strike move. About 89,000 railwaymen, representing 7 per cent of the total non-gazetted employees, stayed away from work on September 19, 1968. The Railway Board withdrew recognition from the All India Railwaymen's Federation and the six unions which had taken part in the strike. This deprived the Federation and the unions on the Eastern, Norhern, North-Eastern, Northeast Frontier, Southern and the South Eastern Railways of negotiating facilities that were available to them under the P. N. M. This machinery continued to function on the Central, Western and South Central Railways.

Wildcat Strikes

While the Government, as a model employer, should treat its employees generously, it also has a duty to maintain services essential for the life of the community. It has to prevent misguided employees from holding the public to ransom, through wildcat strikes, which were engineered not to obtain redress of a general grievance but to force government to accept demands which were patently unreasonable. Such strikes appear to be on the increase. In July 1970, a wildcat strike was started by some employees of the South Eastern Railway, when some West Bengal policemen, jolted on their coach during a shunting operation at Adra, assaulted the shunter who was driving the locomotive. The shunters and running staff stopped work and demanded the arrest of the policemen. A police officer did arrest the policemen and also offered to compensate the shunter who had lost a watch and some money, but the striking men demanded that the policemen should be handcuffed. This incident took place on 26 July, and on the following day the strike spread to Tatanagar, Kharagpur, Santragachi and Shalimar.

The Cost of Strikes

Railway strikes usually cause serious disruption of the freight and passenger services, hit hard the railways' finances and do great damage to the country's economy. To quote an example, we may examine the effects

of the 12-day strike of the loco running staff in the first fortnight of August 1973. About one lakh wagons, one-sixth of the total fleet inclusive of 600 freight trains, were immobilised. At 15 rupees as the daily earning capacity of a wagon in 1973, the strike should have cost the Railways almost Rs. 2 crores by way of loss of freight revenue. But as priority was given to the movement of coal and iron ore, the bulk of the haulage during the strike period was of low-rated traffic, the only exception being 600 wagons daily of foodgrains. The sacrifice of high-rated traffic must have easily cost the Railways another Rs 1 crore, thus, pushing the total loss on account of freight to Rs 3 crores. About a thousand passenger trains had to be cancelled daily which represented nearly one-sixth of the daily coaching service. As Indian Railways earned Rs. 1.25 crores daily from passenger fares and parcels in 1973, this meant a daily loss of Rs. 2.5 crores. Thus the total damage to the railway revenues during the 12-day strike was between five and six crore rupees.

As the return to normalcy was rather halting, the Railways were not able to fully pick up their lost haulage for a couple of weeks. With the assurance that the period of absence will be treated as earned leave many loco men who had participated in the strike took things easy. Reports were coming in till four or five days after the strike had been officially called off by the All India Loco Running Staff Association that at some stations like Bareilly, the men had not resumed work. During this period, there were also some cases of reprisals against those who remained on duty, which created forced absence of men from work. Added to these factors was the shortage of coal brought about by the strike and this prevented the Railways from running full services till stocks were built up. These adverse features caused a further loss of three to four crore rupees. So by the time the Railways limped back to normal working they had dropped well nigh Rs. 10 crores of their revenues.

The curtailment of rail transport at this scale for a period of three to four weeks caused considerable reduction in business activity and industrial production. Though the railways were able to maintain the movement of foodgrains, coal and iron ore at the required level, this could be only at the expense of other commodities in daily use by industry and the general public. Examples were acute scarcity of petrol in Chandigarh and Delhi and that of diesel oil which compelled the Northern Railway to cancel some of its trains. It was not possible to calculate in precise terms the damage suffered by trade and industry but considering their overwhelming dependence on rail transport and the prolonged period of strike it must have run into a figure very close the Railways' own losses, that is about Rs. 10 crores.

1974 Strike

Subsequent to the settlement of the locomen's strike in 1973, some influential elements among railway employees continued to fuel the staff discontent over their emoluments and conditions of work. The All India Railwaymen's Federation under the leadership of Mr George Fernandes, who later on became a minister in the central cabinet formed by the Janata Party in 1977, declared its intention to go on strike on any day after 15 April 1974. Mr. S. A. Dange, CPI leader, who had formed a new organisation, "Indian Railway Workers' Federation" served notice on the Railway Ministry that if six of its principal demands were not settled by negotiation, his federation would give a call for a general strike from 10 April. Yet another organisation that appeared on the scene was "The All India Railway Employees' Confederation" which claimed a membership of 8,00,000 and traded a long list of twenty-nine demands. At its convention at Madras it threatened "work to rule" followed by an indefinite strike if its demands were not conceded. The Jana Sangh Party did not lag behind and after a meeting held at Agra, the Bharatiya Railway Mazdoor Sangh's President declared that a strike by railwaymen all over the country was a certainty. Thus all opposition parties were out to fish in the troubled waters of 1974, already stirred up by economic distress. The various unions of railway employees combined to form the National Co-ordination Committee for Railwaymen's Struggle, the body who actually gave the final call for the strike. The strike commenced at 6.00 a. m. on 8 May and was called off by the NCCRS on 28 May 1974.

Government-Opposition Confrontation

The revision of pay scales and payment of bonus to railwaymen were the common demands of Mr Fernandes's officially recognised AIRF and the unrecognised bodies which sought to give respectability to their charter by adding several other items such as an eight-hour working schedule, linking of dearness allowance to the cost of living index with full neutralisation for every rise of four points in a six-month period, decasualisation of casual staff and their confirmation, adequate and subsidized foodgrains and other essential commodities and withdrawal of all victimisation cases. Putting aside the two major issues relating to bonus and improvement in wages, to which the then Minister for Railways, Mr L. N. Mishra replied with an emphatic no, Government in its anxiety to soften the rigour of economic hardship, were willing to negotiate the other

demands, such as victimisation, decasualisation and food subsidies, but it could do so only through the two recognised and established channels, namely, the Permanent Negotiating Machinery and the Joint Consultative Machinery and not by opening talks with half a dozen disparate militant unions.

The threat had, therefore, to be fought both at the political and the administrative levels. The strategy depended upon the Government's assessment of the following of the various unions in favour of the strike and of the effectiveness of the dissenting NFIR affiliated to the Indian National Trade Union Congress, the labour wing of the Congress Party, One thing was amply clear that the alignment of forces clearly represented a confrontation between the Government and its opponents.

2.5 Lakhs Stop Work

In the circumstances, a countrywide strike of railwaymen could not be prevented. The number of those who deliberately stopped work was 2.5 lakhs. According to the normal operation of the rules, one out of every six railwaymen was liable to suffer break in service, the consequence of which were forfeiture of accumulated leave, a reduction in the scale of free passes, postponement of increment and diminution of post-retirement benefits. Mr Fernandes and many others were jailed. The number who stopped work was large and no enlightened management could afford to carry such a heavy burden of discontent that was bound to infect the entire work-force and sour employee-management relations. In this context, the Railway Board's decision not to derecognise the AIRF was a sound one seen in the light of the fact that both in 1960 and 1968 when this federation had called for countrywide work stoppages, Government had acted in haste and restored official recognition after a few months.

A judicious screening of the 2.5 lakh of indicted men was necessary, too, as the number of men prevented forcibly from reporting for duty as the strike gathered momentum during the week following the work stoppage was large. Support for this view will be found in the statements made by the spokesmen of the Railway Board on 8 May that it "was a marginal strike situation" and only eight to nine per cent of the rostered staff had absented. Strikes always snowball after the first twenty-four hours due to intimidation and this happened in 1960 and 1968 too. The hard core of determined strikers was, therefore, a fraction of the total who stayed away or were forced to stay away from work. Severe punishment of break in service, therefore, was not called for in case of those who did not belong to this hard core.

Punitive Action Reversed

There was a change of government at the centre in March 1977 when the Congress Party yielded to the Janata Party. The re-instatement order of the Minister for Railways, cost the Railways Rs 3 crores and made no distinction between those who had been found guilty of violence and sabotage and others who had been charged with lesser offences such as intimidation of willing workers, holding out grave threats to such workers and generally creating an atmosphere of fear in railway colonies to prevent railwaymen from working.

Multiple Unions

The scenario of the 1974-strike brought out one thing in bold relief, that is the multiplicity of railway unions. The National Co-ordination Committee for Railwaymen's Struggle consisted of half a dozen disparate unions and federations, each one of whom was backed by a political party. A strong trade union movement is as essential to the efficient working of the Railways as well-trained managerial cadres. In this context, growth of mushroom, category-wise associations and sub-unions had been discouraged by Government.

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Customer Satisfaction

Within a few months of the opening of the short stretch of line, 38 miles (61 km) from Howrah to Pandooah, the Board of Directors of the East Indian Railway Company, at their meeting held on 20 February 1855 at the London Tavern, Bishopgate Street, London, went on record :

> "Looking to the small portion of the line opened, the traffic has far exceeded the Board's most sanguine expectation; and perhaps the most gratifying feature is that contrary to a general belief that in the indisposition and the inability of the natives to avail themselves of railway communications by far the largest number of passengers carried has been of the 3rd class. The following is an analysis of traffic : 1st class 5,511 ; 2nd class 21,005 and 3rd class 83,118."

A Vital Need Fulfilled

Many similar reports and newspaper articles that appeared in the third quarter of the nineteenth century bear ample testimony to the great utility of the railways to the Indian people. The railways fulfilled a vital need and generated a great deal of satisfaction among the users. In the first flush of enthusiasm, the customers took to the railways uncritically. But in the very first decade there were complaints about overcrowding and they were so serious that the matter came to the notice of the Secretary of State in London and formed the subject of a terse communication addressed by him to the Governor General of India in Calcutta.

> 1. I have to acknowledge the receipt of your letter No. 83, dated the 25th October regarding complaints of the overcrowding of third class carriages on the East Indian Railway.

2. I am glad to find that the Railway officers have exerted themselves to abate the evil. The space now allowed as sitting room, viz. 20 inches for each passenger is certainly an improvement."

Profitability the Prime Motive

The attitude of the railway administrations to the genuine needs of the passengers varied from one private company to another. The predominant motive was the profitability of the company. A despatch dated 29 March 1860, sent by the Board of Directors of the East Indian Railway Company to its Agent in Calcutta, stated :

> "The Board observe that Mr Stephenson (probably Traffic Manager of EIR) has already obtained authority from the Consulting Engineer to make certain reductions in the tariff for goods and thai he contemplates other reductions as well as certain modifications in the classification of the goods. Mr Stephenson's views may be correct, but if we have one tariff in the North West (country north of Bihar province was called North West Province—*author*) and one in Bengal, complications will arise which must lead to considerable difficulty. It is not only necessary to consider what rates particular goods can afford to pay but what rates compensate the Company for carrying them. Mr Stephenson's views seem to be based principally on the first consideration, the second is the more important to this company."

That profitability of the private companies incorporated in London was the prime motive of building and working railway lines was confirmed in a despatch sent in 1865 by the Secretary of State to the Governor General in Council :

> "On the subject of the rates and fares the rate which will bring the highest profit to the Company is the one which the Government, as well as the Company, are interested in establishing... I consider...that a maximum scale of rates should be definitely fixed."

Concern for Passengers' Comfort

Within the four corners of the broad policy that the railway lines in India should yield a profit to the investors in England, some concern for the comfort of passengers did engage the attention of the British Companies' Agents and other servants in India. The Chief Engineer of Madras Railway Company wrote to the Agent on 16 July 1853 :

> "The carriages should be double-topped with broad eaves. There should be as little harbour for the vermin in the lining, etc. as possible;

> and the seats should be cane covered with matting,... It would be right to meet as far as possible the social and domestic habits of the respectable portion of the native community in these matters—but I trust that no other distinction will be thought of ; that the word caste may never be heard within the walls of a Railway Station and that no circumstances of colour, rank or station shall be permitted to debar a man here, any more than it would be in England, from the free use of the Railway."

Railway Board's Directives

Immediately after assuming charge of their office in 1905, the Railway Board issued a special letter to all the principal railway administrations calling their attention to the desirability of making early provision in respect of facilities for passengers to obtain their tickets sufficiently before the departure of the trains by which they intended to travel ; facilities for examining the tickets of 3rd class passengers both at terminal and roadside stations, to enable them to have ready access to the proper platforms and take their seats without the crush which was liable to occur ; and the provision of adequate sitting accommodation for 3rd class passengers in carriages so as to prevent the overcrowding of trains.

The Consulting Engineers were asked to watch the progress made by railways under their control in regard to the provision of the several facilities and the reports received indicated that a great deal had been done to give effect to the wishes of the Railway Board. Special action was taken by the Railway Board in 1906 to ensure that, wherever practicable means of communication between the passengers and the train guard should be provided. Appendix 20 of the Report by the Railway Board on Indian Railways for the year 1914-15 shows for each of the more important systems the number of mail passengers and mixed trains which had been fitted upto the 31 March 1915 and the total number of trains run. Instructions were also issued by the Railway Board for the fixing of a notice in each carriage indicating the method of using the means of inter-communication. These instructions were largely implemented. But the misuse of this amenity posed a serious problem. Attempts to prevent uncalled for chain pulling were hampered by lack of co-operation by the public, which generally sided with the culprits. Only rarely would passengers identify a chain puller to help railway staff or the police. The incidence of chain pulling has increased in recent years because effective measures could only be cumbersome in the absence of public co-operation. For example, a few arrests by detailing plain clothes policemen in trains which were regularly subject to chain pulling served little purpose. The only effective measure

was the removal or blocking off of alarm chains. This was done on some trains such as those running in metropolitan suburbs. Removal of the facility elsewhere produced complaints of more frequent attacks on passengers at night, particularly women. The result was restoration of communication cords in 'ladies only' compartments.

Reserved Carriages for Women

The Railway Board also issued orders directing that boards should be displayed outside each compartment reserved for women indicating in English and the vernacular of the districts in which the carriage is run that these compartments were for women only. A suggestion was then made that a figure of a woman painted on the doors of carriage reserved for women would prove of advantage as an indication to illiterate women of the carriages which had been specially reserved for them. Experiments were first made on the North Western Railway to ascertain whether this method of distinguishing women's reserved compartment served a useful purpose. The practice was later universally adopted.

Catering Services

Another matter which engaged the attention of the newly formed Railway Board was the improvement of the supply of refreshments for Indian passengers. Special enquiries were undertaken by the Board to ascertain the nature and efficiency of the arrangements made by the various railways for the inspection of licensed refreshment vendors. The practice was not uniform, but in each case means had been adopted for inspecting the wares offered for sale by vendors, and for ensuring, as far as possible, that they were clean and wholesome. While refreshment cars for European passengers had been introduced on most of the important mail and express trains in the early years of the 20th century, similar facilities had not been provided for Indian passengers. The Madras and Southern Mahratta Railway Company had introduced spècial cars fitted with conveniences for the sale of refreshments for Indian passengers and accommodation for washing before taking food in accordance with caste requirements. Such carriages were run on all important mail and passenger trains on the system. The Railway Board brought this to the notice of all the principal railway administrations, some of whom experimented with dining cars for Indian passengers. The experiment, owing to the caste prejudice of a section of passengers proved a failure on the East Indian, Bengal Nagpur and Eastern Railways. In the Punjab, on the other hand, it proved eminently success-

ful and the North Western Railway built a number of refreshment cars for Indian passengers.

Dining cars were open to first and second class passengers only, as were the static refreshment rooms at stations. In both cases, separate vegetarian and non-vegetarian kitchens were provided. In 1954, these were opened to third class passengers also. As a result, they lost the attraction of quiet seclusion and their erstwhile popularity with upper class passengers. While at stations, catering had hitherto been entrusted to vendors and private contractors, it was decided in 1955 to introduce departmental catering, which along with some contractors' establishments has been the general pattern of catering on the Indian Railways. Such services are available at about three thousand stations and on 88 pairs of trains.

The need for supply of drinking water to passengers was recognised early due to the hot climate of the sub-continent. By the first quarter of the twentieth century, the practice of making separate arrangements for Hindu and Muslim passengers had been well established. While water was dispensed to the former by watermen from brass pots and large earthenware, the latter were served by carriers who dexterously supported large skin bottles on their backs. The distinction between communities was abolished soon after India gained Independence. By 1950, electrically cooled water was made available free of charge at large and important stations.

Passenger Superintendents

In 1909, the Railway Board, as an experimental measure, authorised the appointment on the North Western and Oudh and Rohilkhand Railways of a number of officials of a new class designated "Passenger Superintendents." These officers were recruited from among retired Indian officers of the Indian Army. They were given a distinctive uniform and placed under the charge of a special officer of the Traffic Department. Their duties were to attend to the complaints of the humbler class of passengers and to assist them to find room in trains by directing them to carriages where accommodation was available; to supervise the supply of refreshments by platform vendors, and generally to do what was in their power to secure greater comfort and convenience of passengers at railway stations. The experiments having proved successful, the appointment of Passenger Superintendents became permanent on the railways on which they were first introduced, and similar appointments were created on several other railways, in some cases with a different designation, such as "Passenger Guides".

A number of works were carried out during the first quarter of the twentieth century with a view to increasing the comfort and convenience of

3rd class passengers. The more important of these were the construction of enlarged and improved waiting shed accommodation, the substitution of high for low level platforms at the more important passenger stations, the provision of new and improved 3rd class passenger carriages generally of the bogie type and of the same dimensions as those used for passengers of the higher classes. These carriages were fitted with latrines, upper berths and racks, while the roofs were of improved design with greater heat-resisting properties, the provision of passenger instead of mixed trains on all the more important routes and the introduction of 3rd class express trains running at practically the same speed as mail trains, the introduction of improved lighting, mainly electric, in 3rd and intermediate class carriages and improvement in the arrangements made on special occasions at places of pilgrimage or fairs, for instance, by the Oudh and Rohilkhand Railway on the occasion of the Kumbh Mela at Hardwar in April 1915. It was explained by the Railway Board that any further improvement in the immediate future in the direction of the provisions of more 3rd class accommodation was extremely difficult, apart from the necessity for economy imposed upon the railways by World War I on account of the impracticability of obtaining raw material required for the building of coaching vehicles.

Overcrowding

In the nineteen-twenties, the Railway Board arranged for a special census of the actual number of passengers in each train daily on the routes regarding which there had been most complaints of overcrowding. The results received showed that though there had undoubtedly been serious overcrowding on occasions, overcrowding was the exception even on the routes specially selected for examination on account of complaints received. The Railway Board took some steps to increase the accommodation on such routes, but ever since then in the following half century and till this day overcrowding has persisted on important, fast express trains.

Inspite of growth in road transport, the railways continue to be the primary mode of transport for bulk of the passengers, both for long and short distances. The occupation ratio of certain important long distance Mail and Express trains and suburban trains during peak hours exceeds 100 per cent. In order to ease overcrowding Indian Railways have progressively been dieselising long distance trains which were earlier hauled by steam engines. On some of the long distance trains, two diesel engines have been provided to haul 21 coaches. First class coaches are being gradually replaced by A.C. sleeper coaches which have double the capacity of first class coaches. On some of the routes, double decker coaches are

being introduced with higher seating capacity. The seating capacity of second class coaches is being increased progressively.

Rates and Fares

As stated earlier, in the days of company-owned railways, the profit motive was uppermost. Government control had, therefore, to be exercised on the fixation of rates by the Companies, by laying down maximum and minimum freight rates applicable to different commodities, to protect the public and also to permit a reasonable profit as a safeguard against government having to pay unduly large sums to honour its guarantees. These principles were incorporated in the Indian Railways Act of 1890. The railway companies were free to levy any rates which they considered fit so long as the maxima and minima were not infringed. With the growth of traffic interchanged between different railways, it became necessary to have a general classification of goods for observance by all railways. The first such general classification of goods was introduced in 1910 and made applicable for lines which were parties to the Indian Railway Conference Association. A comprehensive study of the rating pattern was made by a special organisation set up for the purpose and a uniform rate structure, comprising telescopic rates on the overall distance was introduced on 1 October 1948. Similar action was taken in respect of passenger fares. In 1977, a Rail Traffic Enquiry Committee was set up. It reported in 1980 and recommended an upward revision of the rates and fares to match the higher cost of various inputs.

Gandhiji's Crusade

In September 1917, soon after his return from South Africa, Mahatma Gandhi addressed a long communication to the press highlighting the inconvenience and discomfort suffered by 3rd class passengers through the length and breadth of the Indian subcontinent. The opening paragraph of Gandhiji's 2,000-word letter more or less summed up the situation :

> "Sir—I have now been in India for over two years and a half after my return from South Africa. Over one quarter of that time I have passed on the Indian trains travelling 3rd class by choice. I have travelled up north as far as Lahore, down south up to Travancore, and from Karachi to Calcutta. Having resorted to 3rd class travelling among other reasons for the purpose of studying the conditions under which this class of passengers travel, I have naturally made as critical observations as I could. I have fairly covered the majority of railway systems during this period. Now

and then I have entered into correspondence with the management of the different Railways about the defects that have come under my notice. But I think that the time has come when I should invite the Press and the Public to join in a crusade against a grievance which has too long remained unredressed though much of it is capable of redress without great difficulty."

He forwarded this communication to the Secretary to the Government of India, Department of Commerce and Industry, under which the Railway Board functioned, as an enclosure to his letter dated 31 October 1917 from Satyagarh Ashram, Sabarmati. The letter opened with the words : "The hardships are of two kinds : those which are due to the neglect of the passengers themselves and those that can only be remedied by the Railway Companies. They may again be divided into those that can be dealt with without any great extra cost and those that can be dealt with only on a large outlay of money." As some of the suggestions made by Gandhiji were novel and have not been implemented, the letter is reproduced in full as Annexure 23-A. The Railway Board took serious note of Mahatma Gandhi's letter and sent him a detailed reply, covering all the points that he had raised, supplemented by detailed notes explaining the position on each railway line. The Board's reply ran into 3,000 words.

Advisory Committees

The Acworth Committee in 1920 recommended the formation of Central and Local Advisory Councils, and emphasised that the Railways would be saved much hostile criticism, if representatives of the people could be associated in an advisory capacity, so that they could directly inform the railway administration of public complaints and help the authorities with the steps they should take to redress these. To Government of India constituted a Local Advisory Committee in each zonal railway, composed of representatives of the State Government, State Legislators, Chambers of Commerce and the travelling public, with the General Manager of the railway as the presiding officer. There were also one or two nominated members. A similar Central Committee was constituted at the Railway Board's level. The local committee discussed issues like provision of amenities to the public, proposals for new projects, opening of new stations, and arrangements of time-table. They provided an important channel for the expression of public opinion on matters affecting the public in different parts of the country. The functions of the committees were only advisory, but in case a General Manager was unable to follow the advice of the majority of members, he had to bring

it to the notice of the Railway Board, so that the position could be reviewed at a higher level. The Consultative machinery was reorganised in 1953 into three tiers—divisional, zonal and national.

Passenger Amenities

Soon after Independence, a minimum standard of amenities was laid down for every station, large or small, and those included a waiting hall, a pucca platform surface, benches and shady trees on the platforms, improved types of latrines, adequate arrangements for lighting and for drinking water and proper booking facilities. Almost every station has been provided with these facilities during the last thirty years. In 1949, reservation of third class seats was introduced for the first time and was extended to cover almost all the important long distance trains. Another important step forward was the provision of sleeping accommodation for third class passengers, which was introduced for the first time on Indian Railways in 1954. In the same year the separate entrances and exits for upper class passengers were abolished. The restrictions in the availability of retiring rooms to third class passengers was also lifted. A Deputy General Manager (Amenities) was appointed on each railway zone to look after the work concerning passenger amenities with a view to ensuring the minimum standards. These officers maintained close liaison between the various departments of the railway for speedy action on all matters relating to passenger amenities and tried to develop a spirit of service among railway staff. As a result, during 1954-55, 4,417 fans were fitted in third class and 663 in inter class coaches. Lower class coaches built to improved specifications were put into service during the year, totalling 341 broad gauge, 249 metre gauge and 17 narrow gauge. Additional booking facilities for the greater convenience of the travelling public were provided at a large number of stations.

There has been a constant effort on the part of the railway administration to bring about qualitative improvement in the level of comfort, particularly for passengers travelling in second class who constitute 96.6 per cent of the total passenger traffic. Concerted efforts were made to provide more cushioned berths/seats in second class coaches and augment sleeper accommodation on mail/express trains. Two unreserved second class coaches were provided on all super fast mail and express trains. Steps were taken to improve the reservation system and to keep the coaches and environment clean. In order to eliminate entry of unauthorised persons in the reserved coaches, travelling ticket examiners and coach attendants were provided in second class sleeper coaches, A.C. two-tier coaches and corridor type first class coaches. Recently, computerised rail reservation has been introduced at New Delhi and is to be extended to other metropolitan cities.

Ticketless Travel

Overcrowding on Indian trains is aggravated by ticketless travel which was a feature of the Indian Railways before 1947, but after that year it became a serious law and order problem, particularly in the states of Uttar Pradesh and Bihar. In U.P. about 50 special magistrates were appointed for the exclusive task of assisting railway officers in carrying out checks on trains in mid-section and punishing the culprits on the spot. Such wayside checks produced hundreds of ticketless travellers, among whose numbers were white-collar office workers, students, traders, members of state legislatures, railwaymen and even policemen. Collusion between railway employees and railway police personnel to escort marriage parties free of charge was common.

While the motive of most ticketless travellers was to save a little money and cheat the railways, they did so during British days ostensibly to harm an alien rule, for they regarded the Railways an instrument of British domination. After the partition, the habit persisted in a more nefarious form, the manifestation of which was a revenge against the government at the Centre, whose baby the railways were, by the citizens of a state who wanted to give vent to a grievance, may be it arose from an increase in school fees, imposition of a local tax, or low prices paid to farmers for agricultural produce, none of which had any remote connection with railway services.

The railway administrations have continued to supplement their normal machinery to check ticketless travel, which consists of ticket checkers at the point of entry and exit at stations and travelling ticket examiners, on running trains, with surprise raids on trains with the help of the Government Railway Police and the Railway Protection Force. Wide publicity is given to these raids in the daily newspapers. On 2 November 1981, in a drive against ticketless travel, 745 passengers, including 55 women, were detained from the Calcutta-bound Bombay-Howrah Mail and Bombay-Howrah Express and from the Tatanagar-Nagpur Passenger at Rajgarh in Madhya Pradesh. These passengers, mostly belonging to Raipur and Durg districts, were on their way to Calcutta to attend a Proutist-cum-Chhattisgarh rally to be held there. They had entered the trains by force and travelled without tickets. According to witnesses over 1,000 people including women and children, who were wearing badges and placards of separate Chhatisgarh and Proutist movements, were travelling without ticket and causing suffocation to bonafide passengers. Some of them also detained the Calcutta Mail for an hour, squatting on the line. The Collector and Superintendent of Police reached the spot with a police force and brought the situation under control. In the third

week of November, 1981 more than 3,000 people were apprehended for ticketless travel in a special raid conducted for 72 hours by the Delhi Division of the Northern Railway on a single day, a fine of Rs. 80,000 was imposed on the offenders and Rs. 40,000 were collected on the spot. More than 1,500 people were sent to jail in default of payment.

According to a statement made by the Deputy Minister of Railways in the Lok Sabha, 47,663 special checks were conducted from 1 January to 31 March 1981. 647,000 passengers were nabbed for ticketless travelling and over Rs one crore was realised as railway dues. He added that 73,650 persons were prosecuted of whom 40,350 were jailed. Judicial fines amounting to Rs 9.61 lakhs were also realised.

Corruption

While ticketless travel hurts the honest fare-paying passenger, corruption among railway staff has wide ramifications and affects almost every facet of railway working. Before partition, it was customary for railway users, particularly in the parcel and freight business, to pay tips to railway staff for favours bestowed, such as booking of goods outside the normal working hours, private labelling and marking of goods, preparation of forwarding notes, etc, which the staff were not required to do in the course of their duty. In return, they received small amounts of cash, which became a habit and was aptly named *dasturi*. Gradually, the habit was extended to tasks that fell legitimately in their sphere of duty, such as correct weighment, timely issue of railway receipts and careful loading of goods in wagons and became extortionate. The next stage was their indulgence in certain malpractices, such as under-weighment, misdeclaration of goods so as to give consignors the benefit of lower charges, holding back of accommodation in trains to give it to willing passengers for monetary consideration, etc.

As public agitation against corruption mounted up, in 1953 a 12-man committee under the chairmanship of Acharya J. B. Kripalani was appointed by Government to study corruption on the railways, and it produced a 200-page report which is a comprehensive summary of the different opportunities open to railway staff for making illicit gains. According to the committee consignors and consignees who did not pay railway officials the customary bribes might suffer in so many ways. Scrace freight wagons would be offered them only for a consideration. Vehicles, especially those conveying perishables or livestock, would be held up on the pretext of mechanical trouble. Staff could claim that consignments did not correspond to the description on the invoices and threaten to raise heavy undercharges unless their palms were greased.

One who paid a bribe was given all possible facilities. His goods would be registered and charged at weights and values lower than they really merited. If he was late in bringing his goods to the station, the railway clerk would offer him an ante-dated receipt or would declare that the wagons were unfit for immediate use and he would thereby escape a penalty. He might even be allowed to overload his wagons or the wagons might be labelled to show more packages than were actually loaded, so that the consignee which in all probability was the consignor himself, could make a false loss claim. If a merchant was unable to unload wagons promptly and was thus liable to pay demurrage, railway staff would delay the placement of his wagons at the unloading point. The clerical staff to ensure co-operation from other trades shared their illicit earnings with stationmasters and supervisors. Break of gauge transhipment stations were good hauling grounds for thieves who enlisted the help of railwaymen. A wagon containing valuable goods could be marked sick and then pilfered at a convenient time, or it could be shunted into an isolated siding for the same purpose. Chalk marks on the sides of wagons containing valuables would be a guide for thieves who stopped trains in isolated spots by cutting the brakepipes or by greasing the rails.

According to the corruption committee, there were many corrupt practices in the passenger business also. Booking office windows would be opened late causing congestion. Because many passengers were illiterate, short-changing and the issue of tickets to destinations short of those paid for was not uncommon. Reservations and tickets would be sold for a consideration to black marketeers who in turn sold them at inflated prices to touts and travel agents. Station porters would occupy unreserved seats in the train while it was being serviced in the yard and would sell them to passengers waiting at the station for a good price. Berths reserved for VIPs and passengers joining *en route* could be obtained by people willing to pay a handsome bribe. As regards ticketless travel, the Kripalani Committee reported that most passengers who travelled without ticket did so with the collusion of the railway staff.

Pilferage of locomotive coal was another problem. It was an old practice that at points where engines cleaned their fires, the local people could rake through the hot ashes, collecting cinders for sale. Others poked the grates of stationary locomotives, in quest of unburnt coal. Sometime a fireman would put a shovelful of coal along the track to oblige his friends and relatives. From there it was a short step for some drivers to regularly deposit coal at certain points from where it was picked up by their accomplices. Similarly, coal disappeared from locomotive sheds finding its way to the market where it was resold.

Annexure 23-A

Letter dated 31 October 1917.

From : Mr. M. K. Gandhi, Satyagrah Ashram, Sabarmati,
To : The Secretary to the Government of India, Department of Commerce and Industry.

I enclose herewith copy of a letter recently addressed by me to the Press on the hardships of 3rd class railway passengers.

The hardships are of two kinds : those which are due to the neglect of the passengers themselves and those that can only be remedied by the Railway Companies. They may again be divided into those that can be dealt with without any great extra cost and those that can be dealt with only on a large outlay of money.

I recognise that the hardships falling under the last category cannot be effectively dealt with whilst the war is going on. They are due to insufficiency of accommodation. On this I venture to suggest that some check can certainly be exercised on the issue of tickets and guards or other officials should be instructed to regulate the traffic. As it is, the strongest find their own seats without any supervision or control by the officials and the weaker ones often find themselves left out. Officials should not only be instructed to regulate the traffic but they should also be required to examine the state of the compartments from time to time and see that no passengers appropriate space to the discomfort of other passengers.

In so far as the passengers are themselves responsible for the evils I have described notices should be pasted on the walls of the carriages and put up at the stations giving detailed instructions regarding the use of closets, etc. Bye-laws prohibiting dirty and offensive practices may be cautiously enforced. A book of instructions in the different vernaculars may be issued together with long-journey tickets and otherwise given gratis on demand. Co-operation of volunteers should be invited from the general public in the prosecution of this educative work.

As to the other grievances, Station Inspectors or other officials should be directed to have the carriages and closets swept and cleaned at every junction or principal station.

Station closets ought to be kept scrupulously clean. Earth and disinfectants should be used every time closets are used. This presupposes constant employment of bhangis at every station. In my humble opinion the importance of the matter demands such employment. It may be a wise thing to set apart special privies which any passenger may use on payment of a nominal fee. At present there is no privacy provided in the station latrines. I think that at a very small cost this can be provided.

There should be bathing facilities at all principal stations.

I understand that only licensed vendors are permitted to sell refreshments at the stations. And a written tariff should be provided and cleanliness of refreshments and vendors should be ensured before the granting of licences. 3rd class refreshment rooms should not be allowed to be in the dirty state in which they are at present but should be kept scrupulously clean.

Untold difficulties are put in the way of passengers getting their tickets on application. Often they are issued only a short time before the departure of trains. The result is bribery, a fight among passengers for the purchase of tickets and disappointment to many.

Musafirkhanas at the principal stations need complete overhauling. There ought to be regulations for the observance of passengers. Benches should be provided in large numbers. They should be cleaned several times during the day. Rooms should be provided for the use of the fair sex.

In my humble opinion all the evils except the provision of extra carriages can be dealt with at a very small additional cost to the railway administrations. What is needed is sympathy and due recognition of the rights of 3rd class-passengers who provide the largest part of the income from passenger traffic.

Though the grievances here adverted to are old, they are pressing enough to demand immediate attention. I hope that your Department will take up the matter at an early date. My services are at its disposal to be utilised in any manner it may deem fit.

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Modernisation

It was not long after the attainment of Independence in 1947 that India embarked on a process of industrialisation which changed the old pattern of traffic. In place of straight rail movement of raw materials, from hinterland to the ports and of finished goods from ports to the consuming centres, a new pattern of criss-cross rail movement emerged due to the establishment of industry in all parts of the country. Also long hauls of foodgrains in bulk began to claim greater capacity of the railway system than before Independence.

As this traffic gathered momentum, it soon became evident that if Indian Railways were to shoulder satisfactorily the increasing burden that would devolve upon them, a transformation of the railway system would be necessary. Impelled by this objective the planners began building up a framework of railway expansion and modernisation. While the First Plan (1951-56) was devoted mainly to rehabilitation, during the Second (1956-61) and the Third Plan (1961-65), Indian Railways undertook a number of major and minor schemes to serve the needs of new projects, and to meet the additional requirements of transport, which were expected to be generated by the planned development of coal, steel and cement industries. In stages, large integrated expansion and modernisation programmes comprising new lines, building of diesel and electric locomotives, integral coaches, large capacity wagons and sophisticated signalling were planned and put through.

In the first hundred years of their existence, the Railways in India had depended almost entirely on steam traction except for some small-scale electrification in the Bombay and Madras areas. With the rapid industrialisation and the growing needs of agriculture, Indian Railways decided to introduce modern methods of diesel and electric traction on the busy trunk

routes, as these types of traction have an inherent advantage over the time-honoured steam engine.

Electrification of Suburban Lines

The history of electric traction in India is intimately connected with the city of Bombay. It dates back to 1925, when the first electric train ran over a distance of 16 kilometres from Victoria Terminus to Kurla. Upto the commencement of the First Five Year Plan, however, only 388 route kilometres had been electrified in 1500 volts dc system in Bombay and Madras suburban areas. The travelling time from Bombay to Poona, a distance of over 192 km was slashed from six hours by steam traction to three hours by electric traction, making it possible for many to live in Poona and work in Bombay. Since then Indian Railways have gone for electrification at a more rapid pace to meet the pressure of suburban traffic around metropolitan cities.

In the fifties, passenger traffic in and around Calcutta had risen to three times the pre-war level. Howrah and Sealdah stations, along with the surrounding suburban sections, had already reached saturation and no further improvement in the conditions of travel was possible under steam traction. Electrification of the Howrah-Burdwan section along with the Seoraphuli-Tarakeshwar branch of the Eastern Railway, covering 142 route kilometres was completed in 1958, on 3,000 volts dc system, raising the number of trains from 66 under steam traction to 126 under electric traction, an improvement of over 90 per cent. The travelling time from Howrah to Burdwan was reduced from $3\frac{3}{4}$ hours to $2\frac{1}{4}$ hours. In 1956, a delegation of the French National Railways visited India at the invitation of the Railway Board and recommended the adoption of 25 kv ac system in India. Subsequently, electrification of the suburban area of Calcutta on the east bank of river Hooghly, served by Sealdah-North and Sealdah-South sections, covering 347 route kilometres was carried out at 25 kv ac system between 1963 and 1966. Also a number of sections electrified on dc system were converted to 25 kv ac system in Madras and Calcutta regions.

Main Line Electrification

For the haulage of main line freight, electric traction beyond a certain density, is the most economical and efficient form of rail transport with the added benefits of higher speeds and heavier loads. As electrification requires heavy initial investment for the fixed traction installations, like overhead contact lines, sub-stations and remote control equipment, there should be a fair amount of traffic offering on a route, so that the fixed costs can be

distributed over a large freight base. The recurring operating costs in electric traction are, however, low and that is where electric traction scores heavily over other forms of traction. Before deciding on electrification of any route, comparative economics of the fixed costs in the form of interest and depreciation on the capital investment and the operating costs were worked out for all forms of traction and if the potential traffic was found higher than the break-even point of electric traction with other forms, electrification was adopted.

As the burden of carrying additional freight for the new steel plants at Bhilai, Rourkela and Durgapur, the expansion of the steel plants at Tatanagar and Burnpur, and the increase in coal production in Bengal and Bihar fields, devolved mainly on the Eastern and the South Eastern Railways, the main and heavy mineral lines in these areas were electrified. Main line electrification was thus taken up during the Second Five Year Plan (1956-61), when 216 route kilometres were electrified. In the Third Five Year Plan (1961-66), the tempo of electrification picked up and another 1,746 route kilometres were electrified. This tempo was kept up in the three years before the advent of the Fourth Five Year Plan so that upto 1969-79, 3500 route kilometres had been electrified. Thereafter the pace of electrification slowed down and in the following ten years, 1400 route kilometres were energised. By 1985, 6325 kilometres, a little over 10 per cent of the total Indian Railways system, had come under electrification.

Diesel Traction

Till the beginning of the Second Five Year Plan, the use of diesel locomotives on the Indian Railways was mainly confined to shunting services. During this Plan, main line diesel traction for carrying through freight services was introduced, as a prelude to electrification on the congested routes of the coal and steel belts in the eastern regions of the country. The first diesels came to India from the USA in 1958 and were based at Chakradharpur,[1] a location central to Tatanagar, Rourkela and Burnpur. From here diesels fanned out in all directions bringing coal, iron ore and limestone to the steel plants at these places. They were housed in a steam shed, without proper facilities for upkeep which posed a challenge to the maintenance engineers and the operating officers. It was an exciting chapter in the modernisation of the Indian Railways. Since then the dieselisation programme has made considerable headway. On trunk routes, which have not been electrified, most of the important super-express goods and mail trains are now being hauled by diesel engine.

Today, diesel and electric tractions dominate the motive power

scene in the context of freight traffic. So far as passenger transportation is concerned steam locomotion still plays an important role. Other inferior services such as shunting operations, assistance services and branch line feeder services are, by and large, operated by steam power. Dieselisation has hitherto been of trains rather than of areas and thus an under-employed steam infrastructure has to be maintained in diesel territory and to a lesser extent in electrified areas. Efforts to reduce the extent of mixed traction on as many trunk routes as possible are being made, within the available resources of diesel and electric locos.

The following table shows the progressive increase in the use of diesel and electric traction over the years measured in terms of train kilometres and gross tonne-kilometres :

Percentage of Train Kilometres by Types of Traction

Year	Passenger				Freight		
	Steam	Diesel	Electric		Steam	Diesel	Electric
			Loco	EMU*			
1950-51	93	—	2	5	99	—	1
1955-56	91	—	2	7	98	—	2
1960-61	91	—	2	7	94	5	1
1965-66	89	1	3	7	61	29	10
1970-71	77	7	7	9	46	39	15
1975-76	65	14	9	12	32	48	20
1979-80	51	23	13.4	12.1	21	59	20
1984-85	38	35	14.9	12.1	10	64	26

*Electric Multiple Unit coaches.

Signalling

To reduce dependence on the human element, various technological aids like track circuiting, axle counters, ultrasonic testing of rails and axles of rolling stock, panel interlocking, automatic warning system have been introduced progressively on Indian Railways. With a view to improve their safety performance and to avoid failure of equipment, railways have gradually been adapting themselves to sophisticated modern methods that provide for fail-safe signalling.

In order to run more trains at higher speeds and with greater safety, the lower quadrant signalling which existed on trunk routes and main lines was taken up for conversion to multi-aspect upper quadrant and multi-aspect colour light signalling in the 1960s in a phased programme. Out of about 6200 block stations, over 1215 stations have been provided

with multi-aspect upper quadrant signalling and over 1404 stations with multi-aspect colour light signalling.

Tokenless block instruments and signal relays, which were imported during the 1960s, are being manufactured in signal workshops of the Indian Railways and some private factories. After considerable experimentation by the Research Designs and Standards Organisation and the Indian Institute of Technology, Delhi, axle counters, the use of which was necessitated by the shortage of wooden sleepers, were developed indigenously and their production introduced in the railway signals workshops. This device counts the axles which have passed over it and certifies the complete passage of a train.

An important aid to safety is the detection of the presence of a train or a vehicle on a portion of the track. This is achieved through the means of clearance by track-circuiting or axle counters which have been provided at 2026 stations. On the broad gauge suburban sections like those in Bomay and Calcutta and on the high speed routes like those on which the Rajdhani Expresses are run, a back-up system was necessary in case a driver did not see a signal or was likely to pass a signal at danger. This has been achieved through the Automatic Warning System introduced in the 1970s. This system is being installed between Delhi and Howrah (1,441 km) and 100 kms of the suburban area of Bombay on the Western Railway.

For handling increased volume of traffic consistent with safety and flexibility, panel interlocking and route relay interlocking installations have been progressively introduced at important junctions. Over 110 stations have been provided with route relay interlocking. One of the most vulnerable spots on a railway is a level crossing, the protection of which is vital for the railways as well as the road users. Provision of lifting barriers, interlocking of gates, and adequate communication and pre-warning facilities have been progressively introduced at busy level crossing gates outside station limits.

Marshalling Yards

Another field, in which modern signalling has been beneficial to railway operation, is that of automation of large marshalling yards which daily receive and despatch thousands of wagons. A vast range of scientific and technological skills has been pressed into service to mechanise and automate marshalling yards. The Indian Railways' pivotal marshalling yard at Mugalsarai, which deals with 6,000 wagons daily, is the nearest example to complete automation, as this yard with track

circuited tracks, has not only push button arrangements for humping and sorting out wagons, but is also fitted with power-operated retarders, which control the speed of wagons moving down the hump, and by thus cushioning the impact, reduce damage to wagons and their contents. Other eight large marshalling yards have been mechanised with a view to increasing the handling capacity and at the same time reducing the incidence of damage to wagons and their contents. In several marshalling yards, the talk-back facility for ready communication between the control and the groundsman has been provided.

Communications

Prompt and reliable means of communications play a very important part in the smooth, safe and speedy movement of trains. They are also indispensable as a primary tool of management. As overhead wire communications were found susceptible to a lot of failures due to wire thefts and vagaries of nature, it was found necessary to instal more reliable means of communication. Indian Railways had been developing their own facilities by employing microwave, with super high frequency and channelling systems.

Modernisation of telecommunication facilities has improved to a great extent the effectiveness of train operations. The progress made in this direction is shown by the figures given below :

Nature of Telecom. facility	Upto the end of 1983-85	Added during 1984-85	Total at the end of 1984-85
1. Telephones Exchange Telephone Capacity (No. of lines)	76,072	2,414	78,486
2. Trunk (Telephone Channel Kms)	264,285	13,000	277,285
3. Telegraph/Teleprinter Channels (Channel Kms)	146,687	1,995	148,682
4. Microwave Links (Route Kms.)	13,793	389	14,182
Railway Electrification.			
5. RE Telcom. quardruple cable (Route Kms.)	6,105	335	6,440

Track

With the progressive strengthening of the track, the length of broad gauge track laid with 52 kg per metre or heavier rails has added upto over 20,716 km and that of metre gauge track laid with 37.20 kg per metre or heavier rails to 4,658 km. Special wear-resistant rails have been used in the track on sections having steep gradients and sharp curves, where rails wear out fast as also on high-density suburban sections.

Earlier, Hallade Track Recorders were used for assessing the geometry and running characteristics of track which did not give very satisfactory and scientific results. Lately more sophisticated track recording cars, oscillograph cars and portable accelerometers have been pressed into service for monitoring the track. These machines are run on regular intervals depending upon the importance of a route. It has thus become possible to make more precise assessment of track defects under running traffic conditions rather than depending on the subjective assessment of track parameters done earlier by footplate or rear window inspections.

Rails welded into long lengths are being laid in the track progressively so as to reduce maintenance problems and fuel costs. The reduction and elimination of rail joints, besides reducing noise level, has also made it possible to dispense with the necessity of providing fish-plated rail joints, resulting in safer travel and less wear and tear on both the rails and the rolling stock. On trunk routes, rails are being welded into long continuous lengths of one kilometre or more. On other routes, adoption of short welded rail panels, that is joining up of three rails to form a single rail panel of 39 metres, has been quite common for a long while now. By 1984-85, 43,838 kilometres of track had been laid with welded rails of which 11,498 kilometres comprised long welded rails.

Till recently, only wooden, steel and cast-iron sleepers were used on the Indian Railways. It had, however, been experienced that cast iron sleepers were not suitable for high traffic density and high speeds. Steel and wooden sleepers have also been in short supply. Prestressed reinforced concrete sleepers with improved elastic rail-to-sleeper fastening have been increasingly used on high density and high speed routes.

The traditional method of track maintenance on the Indian Railways was to give it detailed attention from one end to the other. Since the 1970s, on important routes the maintenance of track has been mechanised increasingly by means of 'on-track' tie tampers. Sixty-nine tie tampers are already working and another 16 are on order. Points and crossing tampers and shoulder crib consolidators are also being procured for track maintenance work. The need-based directed track maintenance method,

which requires inputs of maintenance effort only to the extent actu a lly required, has been widely adopted. Another improved method of maintenance, *viz*. measured shovel packing has also been adopted.

The Production Units

Chittaranjan Locomotive Works (CLW) in West Bengal produced its first steam engine in 1950-51 and achieved a production level of 173 locomotives per year during 1950-60 against the target of 168. In December 1971, it produced its last steam engine, taking the total production to 2,351 broad gauge units. During these years most of the metre gauge engines were built by Tata Engineering and Locomotive Company, a private sector firm. C. L. W. turned out its first dc electric loco in 1961-62 and its first diesel hydraulic shunter in 1967-68. The factory introduced a new line of production, namely, the diesel-hydraulic shunter, fitted with Suri hydro-mechanical transmission designed by a railway engineer after whom it is named. Overall production till March 1985 totalled 1,028 electric locos, 493 diesel-hydraulic shunters and 60 narrow gauge diesel-hydraulic locos. The electric locos produced include 53 dual current ac/dc locomotives which can operat both on 1500 V dc and 25 kv ac electric supply.

Diesel electric mainline locomotives as also shunters, are built by thee Diesel Locomotives Works (DLW) at Varanasi in Uttar Pradesh. This factory commenced production of broad gauge locos in 1963-64, and from 1968-69 it also started manufacturing metre gauge locomotives. No diesel electric locos have been imported since then. Upto March 1985, the Works had delivered 1,437 BG (W D M-2) and 333 MG diesel-electric locomotives, besides 183 high capacity diesel shunters (WDS-6) and 21 shunters (WDS-5). The import content of an AC MT electric locomotive turned out of CLW is only 6.27 per cent, including wheel sets and that of a diesel electric locomotive turned out of DLW about 3.05 per cent for WDM-2 class and 4.31 per cent for YDM-4 class. Similarly the import content of a WDS-4 diesel shunter produced by CLW is 9.74 per cent.

The bulk of passenger service vehicles are manufactured in the Integral Coach Factory (ICF) at Madras in Tamil Nadu. Like CLW and DLW, ICF is also administered by the Railway Board. ICF's production is supplemented by two public sector undertakings Bharat Earth Movers Limited and Jessops ; these three together meet the entire requirements of the Indian Railways. Since ICF commenced production of passenger coaches in 1955-56, it has turned out 15,827 (fully furnished) passenger service vehicles uptil March 1985. Originally planned for manufacturing 350 third class coach shells per annum, ICF's capacity was expanded in 1973-74 to 750 fully furnished coaches per year and is now being increased to 1,000 per year. Passenger service vehicles produced by ICF and Jessops include

electric multiple unit coaches also. The electrical equipment for these is manufactured by another public sector unit—Bharat Heavy Electricals.

Research and Designs

More than a century ago, there were a number of small railways in India functioning independently and there was little coordination among them in respect of the design of the permanent way, rolling stock and other equipment. With the growth of traffic and the railway network, need was felt for the creation of common standards for permanent way, rolling stock, etc. The Indian Railway Conference Association (IRCA) was set up in 1903 to enforce coordination and standardisation. Subsequently, in the 1920s, the Railway Board adopted a firm policy of progressive standardisation and set up a number of committees for the purpose. For instance, at its sixth meeting in January 1929 the Track Standards Committee considered the preparation of designs for ordinary acute and obtuse crossings, switches for heavy sections of rails, revised designs for standard dog spikes, bearing plates and steel crossing sleepers with moveable jaws. Also in the 1920s the Bridge Standards Committee dealt with the maximum axle loads that may be permitted to run on rails of various sections at various speeds. Similarly, the Signalling and Interlocking Standards Committee considered the important subject of different types of token instruments used for giving line clear to trains.

The Research, Design and Standards Organisation (RDSO) of the Indian Railways was constituted in 1957, by combining the Central Standards Office, set up in 1930, for the production of standard designs and specifications for railway equipment, and the Railway Testing and Research Centre, established in 1952. The RDSO developed facilities for investigating a wide range of engineering problems, relating to the development of designs of railway infrastructure. Its efforts brought about a large measure of self-reliance to the Indian Railways, in the matter of design, manufacture and operation. The Organisation has played an important role in the elimination of the need for foreign know-how in respect of all but the most sophisticated traction and electronic equipment, by tendering technical advice to the manufacturers of railway equipment in India.

Some recent activities of the RDSO include : feasibility trials with specially manufactured rakes for high speed trains in order to anticipate the likely operational problems, stipulation of streamlined procedures, establishing maintenance tolerance for track and coaches, and obtaining data on the rolling resistance at high speeds. By the early 1970s, RDSO was in a position to design and standardize diesel locomotives for a variety of services, freight and passenger, mainline and shunting. Since then this

organisation has been engaged in the design development of electrical equipment for the manufacture of 1,500 V dc and ac mixed traffic locomotives for general use. For specialised requirements, an ac/dc dual voltage locomotive for the Bombay-Sabarmati section of the Western Railway, a special type push-pull locomotive for Bombay suburban services, modifications necessary for the conversion of the push-pull rakes of the Eastern Railway for Electric Multiple Unit operation, a fully air-conditioned pantry car for the Rajdhani Express, with equipment for supplying pre-cooked food and cold drinks, and design of locomotives for the narrow gauge, have also engaged the attention of the Organisation.

In the 1970s, a special duty 180-tonne payload well wagon was designed for transport of heavy transformers for Heavy Electricals India, Bhopal. Another major design was the development of an indigenous $22\frac{1}{2}$-tonne axle load high speed bogie for wagons, a fabricated prototype of which was successfully tested. The Organisation also designed a prototype 90-tonne open gondola type box wagon, for bulk movement of iron ore on the Dandakaranya-Balangir-Kiriburu line for export through the port of Visakhapatanam. A new general purpose broad gauge four-wheeled covered wagon, CRT, with a payload of 27.54 tonnes against an average of 22.5 tonnes for ordinary covered wagons, was designed and put into service.

In the sphere of civil engineering and signalling, the Organisation designed safe profiles for abutments in brick masonry and lime mortar for supporting girder spans of lengths upto 80 metres, to check the strength of sub-structures under coupled diesel and electric locomotives. The manufacture of a prototype track recording car commissioned for measuring track geometry was completed. In signalling, the RDSO's contribution, among other things, was to work out the details of circuits for route relay interlocking of large, complex marshalling yards, audiofrequency track circuit equipment, prototypes of last vehicle check device and automatic warning systems. A hot box detection system has been developed successfully.

In the closing years of the 1970s, oscillation trials were conducted on prototype high speed locomotive bogies fitted under a WDM-4 loco superstructure upto a speed of 160 km per hour on Rajdhani route of the Northern and Eastern Railways. The results showed satisfactory riding characteristics upto the highest test speed of 160 km per hour. The design for the driver's alertness alarm and safety control device for broad gauge diesel locomotives was completed after a series of extensive field trials.

The work of the preparation of signal and telecommunication designs and special installation techniques for higher traction currents for Waltair-Jagdalpur-Kirandul sections, which were experienced for the first time on Indian Railways, was given to an international consultancy organisation, viz. Sofrerail, France. As the consultants could not give satisfactory designs suitable for Indian conditions, these were evolved by RDSO and

the work completed satisfactorily on Jagdalpur-Kirandul portion of the section.

Containerisation

The first container service on Indian Railways was introduced in February 1966 between Bombay (Carnac Bunder) and Ahmedabad (Asarva) with containers of 4½ tonne payload hauled by tractors, one at time to the rail head and loaded four to a 4-wheller flat truck. In December 1967 a container service was introduced between Carnac Bunder and New Delhi with road units capable of taking two containers at a time. In November 1967 a folding type of container was introduced in service between Gwalior and New Delhi. The Research, Designs and Standards Organisation later evolved an improved type of container capable of carrying a payload of 5 tonnes which could be used both on broad gauge and metre gauge. The domestic container service operated between 16 pairs of stations in 1984-85. The Indian Railways have recently developed infrastructure facilities for handling international standard containers at ports and five inland depots.

Data Processing

Computers were introduced on the Indian Railways in the late 1960s and were first employed for materials management and preparation of station accounts. For the former the preliminary work undertaken preparatory to computerisation consisted of coding of various data required to be fed into the machine, viz. price list numbers, consignees drawing the material, allocation of expenditure, stocking depots, wards, etc. In a large undertaking like the Railways using 35,000 items, coding had to be done very carefully so that this would enable sorting out and presentation of data in as many combinations as required by the management. A seven digit code, followed by an eighth check digit, was adopted as the standard. The nomenclatures obtaining for the same item on all the zonal railways and production units were unified, with the codification of all stock items on an 8-digit numeric system, replacing the alpha-numeric system previously in vogue. This was followed by the elimination of manual price ledgers and of the manual posting of transactions, progressing of purchase orders and evaluation of vendor performance, scrutiny of bills submitted by suppliers and recoupment functions previously done manually by depots.

A computer in the Railway Board's office records the movement of goods trains and wagons, interchanged among railways from day to day. Before the computer was installed, this work was handled by the Indian Railways Conference Association, an organisation for maintaining and recording inter railway transactions and making adjustment of hire charges,

due from one railway to another for holding rolling stock in excess of ownership. The Association relied upon the ordinary post and telegraph for obtaining returns from interchange points, and it was generally not able to present an uptodate picture of the holdings on different zonal railways. The computer, fed by wireless and microwave communications, is able to process the data received from interchange points with much better speed and accuracy.

Reservation of seats and berths has been computerised at Delhi and the system is being extended to other metropolitan cities.

Modernisation of Workshops

Acquisition of more sophisticated items of rolling stock such as diesel and electric locomotives and continuing increase in the number of wagons and carriage fleet, necessitated not only the creation of new facilities, but also the expansion and modernisation of the existing workshop facilities. The machinery and equipment had become old and worn out, requiring replacement in a phased manner, so as to be able to cope with the increasing maintenance demands of new additions to the rolling stock fleet. To undertake this modernisation programme, a Central Organisation of Workshops was set up in 1979. Under the first phase of the modernisation project, intensive modernization of five selected workshops, namely, Chittaranjan Locomotive Works, Kanchrapara Workshop on Eastern Railway, Kharagpur Workshop on South Eastern, Matunga Workshop on Central and Lower Parel Workshop on Western were taken in hand. Modern high production machine tools procured under the modernisation programme have already improved availability of critical components required for repair of rolling stock.

For phase II of the modernisation programme, seven workshops have, been selected. These are Parel on Central Railway, Liluah on Eastern Jagadhari on Northern, Golden Rock on Southern, Kharagpur on South Eastern, Ajmer on Western and the Integral Coach Factory, Perambur, Madras.

Calcutta Metro

A 16.43 kilometre underground railway to serve Calcutta city has been under construction since 1973. The proposed Metro is a modern project by Indian standards and incorporates novel construction features. The cut-and-cover method of construction has been well established. The system will have two underground tunnels, 300 and 600 metres long, respectively, on either side of Chitpur yard. On the west of Chitpur yard, a 20-metre deep shaft has been constructed and shield tunnelling is in progress. This is the first such venture in India.

In 1984-85, a stretch between Esplanade and Bhowanipur, covering a distance of 3.5 kms, connecting five stations was opened for commercial operation and another stretch of 2.2 kms between Dum Dum and Belgachia sections was opened later on. In the sections opened for traffic, radio communication between motormen of the trains running in tunnels and the central control has been provided by using indigenous technology, Emergency Telephone Address System has also been provided at all stations and on trains.

NOTES AND REFERENCES

1. The author was the first recepient of diesel Locomotives in India, when he held charge of the Chakradharpur Region.

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Railway Planning

Planning as a preliminary to execution is a recent concept on the Indian Railways. The first reference to planning figured in the 1925 papers under the subject "Programme", though the details mostly consisted of proposed works. Subsequently, the concept gradually developed into "Works Programme and Planning". A separate heading "Projects" had figured in the proceedings since 1922, but in the 1930 index of proceedings of the Railway Board, both these had disappeared and subjects relating to these heads were lumped together under "Works". During World War II, the term "planning" was used in connection with the works and schemes that were related to Air Raid Precautions (ARP).

Since Independence the Indian Railways have followed a course of planned development in keeping with the national Five-Year Plans. The process started in 1950 with the First Plan and continued uninterrupted till 1965, the end of the Third Plan. Then there was a pause for three years and planning picked up again in 1969. During the first two plans, the Railways were mainly concerned with the rehabilitation and replacement of old assets. After the loss of some major workshops situated in Pakistan, a great deal of improvization and prudent housekeeping were necessary for the maintenance and overhaul of wagons, coaches and locomotives. The objective of the Third Plan was to develop sufficient capacity so that rail transport did not become a bottleneck in the development of agriculture and industry. A beginning was made in the modernization of traction through dieselization and electrification, improvements in signalling, track and rolling stock. Since then, the main thrust of railway development has been towards increased capacity to move goods traffic, towards self-sufficiency and improved utilization of existing assets and modernization.

First Three Plans

The table that follows gives particulars of the expansion of capacity of the Indian Railways during the first three five-year plans and the period 1966-69, during which planning on the basis of five years had been suspended.

	First Plan	Second Plan	Third Plan	Annual Plan 1966-67	Annual Plan 1967-68	Annual Plan 1968-69
New Lines (kms)	1,304	1,311	1,801	52	269	740
Doubling (kms)	370	1,512	3,228	476	532	260
Electrification of railway lines (route kilometres)	...	361.5	1,746	404	150	351
Manufacture and procurement of rolling stock						
Locomotives	1,586	2,216	1,864	294	308	275
Coaching stock	4,758	7,718	8,019	1,264	1,258	1,273
Wagons (in terms of four-wheelers)	61,254	97,959	1,44,789	21,207	17,634	16,476

To complete the picture upto 1968-69, given below are details of the rolling stock produced by the three manufacturing units :

	1951-52 to 1967-68	1968-69
Chittaranjan Locomotive Works		
(Started production in November 1950)		
Steam Locomotives	2,179	68
Electric Locomotives	169 (21 AC) (148 AC)	48 (AC)
Diesel Locomotives	2	17
Boilers	2,118	76
Integral Coach Factory		
(Started production in October 1955)		
Passenger coaches (un-furnished shells) including Electric Multiple Unit Stock	6,084	640
Number of shells furnished	4,115	635

Diesel Locomotive Works		
(Started production in January 1964)		
Diesel Locomotives	199	74

The Fourth Plan

The Fourth Plan of the Indian Railways, as originally prepared by the Railway Board, had envisaged an outlay of Rs. 1,700 crores, but financial constraints compelled them to curtail it to Rs. 1,525 crores. Further, in view of the drop in freight traffic in the second half of 1970, the Plan provision was slashed by Rs. 250 crores, reducing its size to Rs. 1,275 crores. According to the Planning Commission's document on the Fourth Plan, it was estimated that the originating freight traffic on the Railways in 1973-74, the last year of the Plan, would be 290 million tonnes. The provision made for rolling stock was, however, sufficient for 265 million tonnes only and it was hoped that the Railways would be able to meet the requirements of additional traffic by more intensive utilization. The freight traffic on the Railways had been growing steadily in the 1960s and in 1969-70 the Railways lifted 208 million tonnes of originating traffic, though this was 4.5 million tonnes short of the target.

The upward trend was reversed in 1970-71 for various reasons, namely, bad law and order situation in eastern India, a series of railway strikes, disruption of communications caused by the theft of control and traction wires, and setback in the production of steel due to plant dislocation and labour unrest. In May 1971, the Railways found that the revenue earning traffic in 1970-71, as distinct from coal and stores handled for their own use, had dropped by 5.2 million tonnes as compared to 1969-70. The total originating freight traffic, both revenue and non-revenue, that actually materialised in 1970-71 was 199 million tonnes only. This was 18 million tonnes short of the anticipation of 217 million tonnes as indicated in the Interim Railway Budget presented in February 1970. The Railway Board and the Planning Commission, therefore, scaled down the physical targets of originating freight traffic from 265 to 240.5 million tonnes, and reduced the Plan outlay by Rs. 250 crores. While recounting these events during the course of his final Budget speech on 24 May 1970, Mr. K. Hanumanthaiya, the Minister for Railways, observed that "as a result of the revival of the economy, there may be an upsurge in the traffic demands in various parts of the country." Not long after, barely a week from his presentation of the Budget, the Minister informed the Lok Sabha categorically that the cut of Rs. 250 crores in the Railway Plan was

not justified and he intended approaching the Planning Commission for its restoration. He went on to add that the cut was made because of strikes and bandhs which had adversely affected production of steel and other industries. The Fourth Plan anticipations for passenger traffic were 20 per cent growth in long distance and 25 per cent in suburban traffic. This more or less conformed to the actual growth pattern during the Fourth Plan, at the end of which that is in 1973-74, the number of originating rail passengers stood at 2,654 millions, consisting of 1,437 millions suburban and 1,217 million non-suburban passengers.

The Fifth Plan

The original outlay for the Railways' Fifth Plan was Rs. 2,350 crores. On reappraisal on account of an escalation of 50 per cent in wholesale prices between March 1973 and September 1974, the proposed outlay was increased to Rs. 3,250 crores. But as prices came down and the Railways' capacity to make optimum use of their assets improved, they could not sustain their demand for higher funds. The pendulum, however, swung a little too far in the other direction and the Planning Commission reduced the Railways' allocation to Rs. 2,152 crores, excluding Rs. 50 crores for metropolitan transport projects. Out of the allocation of Rs. 2,200 crores, the Railways spent barely 30 per cent in the first two years (1974-76) which was 10 per cent less than the budget proportion. These years were plagued by acute scarcity of funds due to world-wide economic recession and inflationary pressure. The Railways got on the average Rs. 360 crores, which was not a correct index of the new assets created, as cost escalation had made a severe dent into the physical content of the Plan.

So at the beginning of 1976-77 when the economy was posed for an upsurge, the Indian Railways faced the danger of being starved of funds they direly needed to buy more rolling stock and to double or upgrade heavily worked sections of the line. To catch up with the under-provisioning in 1974-76 and to brace themselves for heavier loads, they presented to the Planning Commission a demand for funds to the tune of Rs. 530 crores, excluding the outlays on metropolitan transport schemes. Though this was 50 per cent more than the level of Rs. 360 crores, the rate at which the Railways spent in the first two years of the Fifth Plan, there was to be no increase in the number of wagons and coaches to be actually procured in 1976-77 as compared to 1975-76, due obviously to a backlog of unfulfilled orders. There was to be some marginal increase in the number of diesel and electric locomotives.

There were many ongoing schemes relating to the increase of line capacity, such as doublings and gauge conversions, which had moved at a snail's pace in the period 1974-76 due to limitation of funds. It was necessary to accelerate their progress in 1976-77, and to undertake new schemes for carrying coal, the production of which, as forecast by the Ministry of Fuel, was to go up from 78 million tonnes in the Fourth Plan to 135 million tonnes in the Fifth Plan. There was also need for developing terminal facilities in large cities for the introduction of more passenger trains. Even the increased allocation of Rs. 530 crores, the Railways feared, would not enable them to cater for more than 250 million tonnes of freight traffic, as against the figure of 260 million tonnes they had accepted at the time of the mid-term appraisal of the Fifth Railway Plan and of 300 million tonnes that the Planning Commission had envisaged when the Plan was formulated.

In spite of these dark forebodings, the Planning Commission was not able to find more than Rs. 410 crores for the Railways for 1976-77. When the Railways pressed their demands further backed by their credibility established during 1975-76, this figure was increased to Rs. 420 crores, inclusive of Rs. 10 crores for MTP in the Fifth Plan, marginally higher than the expenditure incurred in the Fourth Plan.

The Sixth Plan

The Fifth Five Year Plan was originally intended to cover the full five-year period ending 1978-79 but it was terminated a year in advance. This was followed by the rolling plan concept, later given up, and the five-year plan covered the period 78-83. According to the projections in 1978, the originating freight traffic was likely to go up to 300 million tonnes per annum by 1982-83; and for passenger traffic the growth anticipated was 3% to 4% in non-suburban and 6% to 7% in suburban traffic. The total need-based requirements of the Railways for 1978-83 plan period, were estimated at Rs. 4,185 crores, excluding the requirement of metropolitan transport schemes and investment in road services. The Planning Commission had indicated that the total amount likely to be made available for the Railways in 1978-83 Plan would be Rs. 3,145 crores only, excluding MTP and road services. Eventually, the figure was raised to Rs. 3,400 crores.

The Sixth Plan of the country was, however, completely overhauled in 1980 and the allocation for the Indian Railways for the period 1980-85 was fixed at Rs, 5,100 crores. In his budget speech in February 1981, Mr. Kedar Pandey announced : "The plan outlay for the Railways under the Sixth Five Year Plan for 1980-85 is Rs. 5,100 crores—a substantial

step up over the outlay of Rs. 3,400 crores indicated for the new defunct 1978-83 plan, but still very much short of the requirement of the railways for creating additional capacity, opening up new lines and overtaking the arrears in renewals and replacements. Judicious apportionment of the scarce investible resources amongst the various competing and compelling requirements has been a tough exercise. Since the most pressing requirement is for rehabilitation, it has been decided to give top-most priority to replacements and renewals. Appreciable dent will be made in the backlog in track renewals and replacement of wagons. It is expected that replacement of over 50,000 wagons in terms of four-wheelers, 5,000 coaches and 300 electrical multiple units and renewal of 14,000 kilometres of track will be achieved during this plan period. On account of this main thrust, the 1980-85 Railway Plan can well be termed a 'rehabilitation plan'. Simultaneously, as a long term objective, the pace of electrification is also being accelerated in the national interests. Despite these steps, the gap between the demand for rail transport and its availability will exist, but the bare needs of the core sector of the national economy will get adequate priority. A good proportion of the balance available has necessarily to be set apart for completing the on-going projects of a capacity-generating nature so that the benefits of these projects become available to the nation at the earliest. As a consequence, allocations for new lines and gauge conversions will be much below the levels required until additional resources become available."

Some of the important features of the Sixth Plan were the acquisition of about 1,00,000 wagons (in terms of 4 wheelers), 5,680 ordinary coaches, 390 electric multiple unit coaches and 780 diesel and electric locomotives, renewals of about 14,000 kms. of track, setting up of a new wheel and axle plant near Bangalore to increase availability of wheels and axles, a workshop modernisation programme and electrification of about 2,800 kms. of track. The Plan break-up of the outlay proposed in the Plan and actual outlay are given below :

	(Rs. in crores) Proposed in the Plan.	Actual Outlay.
Rolling Stock	2,100	2,312
Track Renewals	500	1075
Traffic Facilities	480	778
Electrification	450	434
New Lines	380	316
Workshops and Sheds	280	422
Metropolitan Transport Projects	255	297
Machinery and Plant	230	200
Signalling and Telecommunications	90	160
Bridge Works	90	96
Staff Welfare and Housing	90	101
Investment in Road Services	50	85
User's Amenities	25	26
Other Electrical Works	20	46
Miscellaneous	20	37
Inventories	40	127
	5,100	6,752

The Seventh Plan

The Seventh Five Year Plan provides for an outlay of about Rs. 12,334 crores for the Railways. The Plan envisages more than 50 per cent of the resources being generated internally by the Railways, against an average of about 42 per cent in the Sixth Plan. During the Plan it is programmed to procure 96,000 wagons in terms of four-wheelers, 6,970 passenger coaches, 950 Electrical Multiple Unit coaches and 1,235 diesel/electric locomotives, undertake approximately 20,000 kilometres of track renewals and electrify 3,400 route kilometres of line.

Corporate Planning

A Corporate Plan is "a process over time involving strategic, project and operational business planning designed to promote the continued profitability and well-being of a firm with particular reference to the long term." This is how the British Railway Board defined their Corporate Plan when

they first launched it in 1970. For the Indian Railways, the essentials remain the same, except that the emphasis will not be so much on "profitability" as on serviceability. The Corporate Plan of the Indian Railways covering a 15-year plan up to 1988-89 was finalised in 1976. The Plan defined the corporate objectives of the Railways and outlined the strategies to be adopted for meeting the demand in future.

The Indian Railways envisage that in the year 2,000 they will lift between 515 and 540 million tonnes of originating freight traffic, haul between 330 and 345 billion net tonne kilometres and carry passenger traffic to the extent of 400 billion kilometres.

For moving the higher volume of freight traffic by the year 2,000 some of the startegies envisaged are :

(i) Heavy haul freight trains with trailing loads up to 9,000 tonnes, over high density routes.

(ii) Modern freight cars with air brake system and superior motive power, modern maintenance facilities for track and rolling stock, and bringing down operational costs through the use of computers.

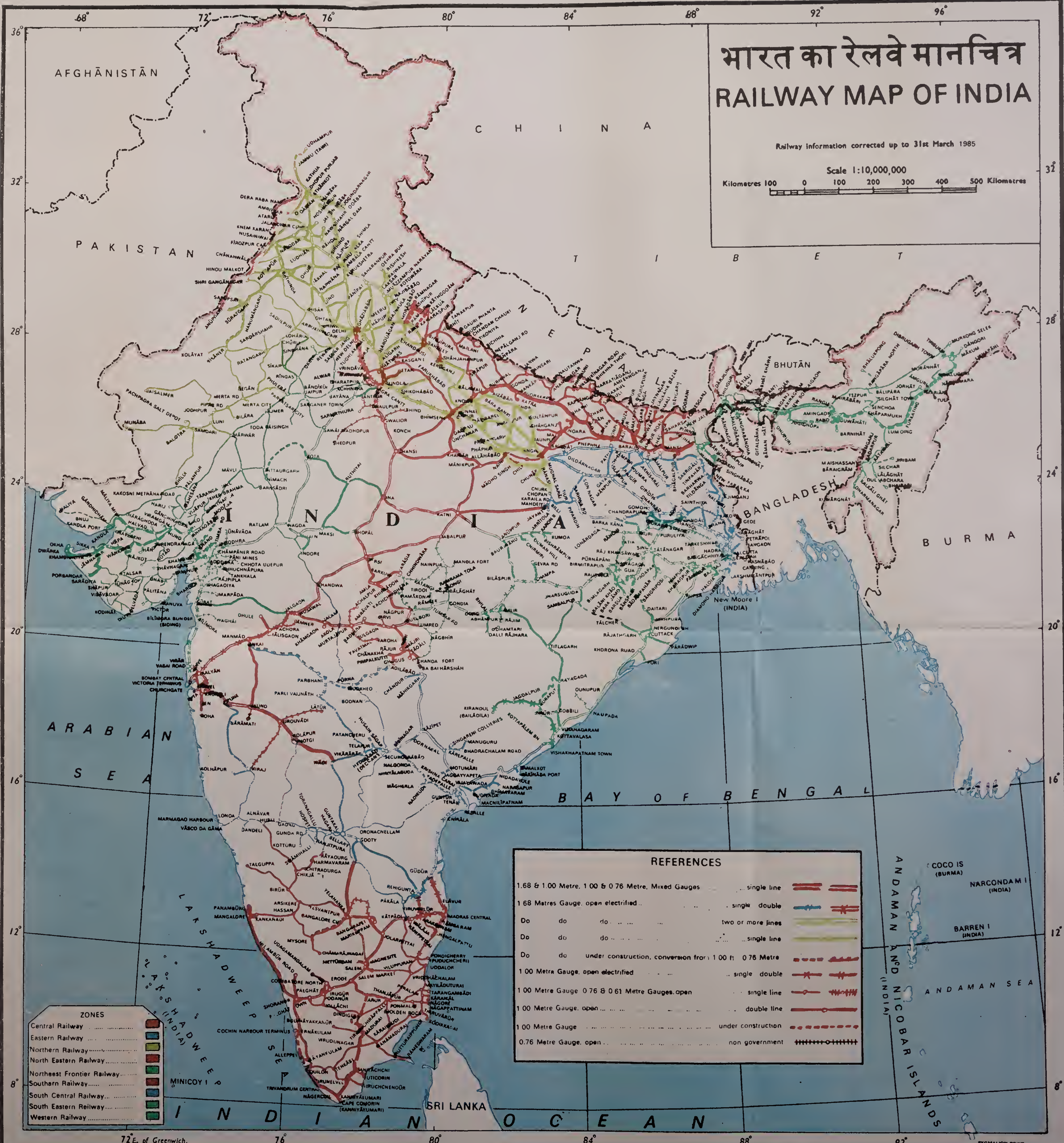
(iii) Eliminating steam locos, intermediate marshalling yards and exchange yards and doing away with wagons with low speed potential.

Progress over Thirty-Five Years

In this epilogue, it will be opportune to take stock of the progress made by the Indian Railways in physical terms, during their planned development over the last thirty-five years and to take a prospective view of some changes which have taken place in recent years as these are pointers to the shape of things to come.

While the capital-at-charge of the Indian Railways was just Rs. 827 crores in 1950-51, it grew steadily to Rs. 2,680 crores by the end of the Third Plan in 1966. After that year, the inputs were stepped up so that the capital rose to Rs. 5,485 crores in 1980. The value of assets created by the Indian Railways from their own internal resources (excluding renewals and replacements) increased tenfold to Rs. 1,244 crores in 1979-80.

The extension of the network during the last thirty-five years was marginal, from 53,596 kilometres in 1950 to 61,850 kilometres. The electrified routes, which were confined to the suburban sections in 1950, increased from 388 kms to 6,325 kms, electrification having been extended progressively to important trunk routes.



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भारत के महासर्वेक्षक मेजर जनरल गिरीश चन्द्र अग्रवाल, बी.ई. (आनर्स) (सिविल), एम.एस.सी.पी.एच.ई. (आई.टी.सी.), एफ.आई.एस., एम.सी.ए., एम.ए.एस.पी.आर.एस., के प्राधिकार से प्रकाशित,

Published under the authority of Major General Girish Chandra Agarwal, B.E.(Hons.)(Civil), M.Sc.Ph.E.(I.T.C.), F.I.S., M.C.A., M.A.S.P.R.S., Surveyor General of India,

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While the number of goods wagons and passenger vehicles had nearly doubled over the thirty-five year period of planned development, the story of locomotives is somewhat different. While there was a large accretion of diesels and electrics as a consequence of the Indian Railways having decided at the time of entering the era of planning in 1950 to adopt the modern means of traction, the number of steam locomotives registered an upward trend up to the end of the Third Plan (1966), from 8,120 to 10,613. Since then the curve has steadily moved downwards to less than 6,000. There was a remarkable increase in the number of electric multiple unit coaches from 460 in 1950 to 2,473 in 1980 and 2,957 by 31 March 1985, which was in step with the almost fourfold increase in suburban passenger traffic. Detailed figures will be found in Annexure 24-A.

The progress in the volume of traffic carried was spectacular in the passenger business, which rose from the 1950 figure of 412 million originating passengers in the suburban lines serving the metropolitan cities to 1903 millions in 1980 and 1,884 million in 1985. The corresponding figures for non-suburban passengers were 872 million, and 1,602 million and 1449 million. The picture of the freight business in terms of originating revenue earning tonnage was, however, uneven. Starting with 73 million tonnes in 1950, it reached a plateau at the end of the Third Plan (1966) to register 162 mt. In the following three years of annual planning, it picked up to 174 mt, but dropped to the 1966 figure, that is 162 by 1974, end of the Fourth Plan. The year 1976-77 registered the peak of 212.6 mt. and after that there was a decline to 193 mt in 1979-80. The latest trend has been upwards, rising to 236 mt in 1984-85.

Towards Self-Sufficiency

At the beginning of the era of planned development in 1950-51, Indian Railways were importing about 23 per cent of their equipment and stores and this figure jumped to 26 per cent in 1955-56. Since then, such imports have been progressively reduced to 5.7 per cent. Nevertheless, Indian Railways have still residuary need for import of certain essential raw materials, proprietary and other hard-core items.

The manufacture of such specialised items calls for sophisticated manufacturing techniques, high capital investment and foreign collaboration in most cases, which are found to be economically viable only if the volume of requirements is substantial. Railways have taken step to set up the Wheel & Axle Plant in Bangalore and Diesel Component Works in Patiala, in their drive towards self-sufficiency. Commercial incentives are given to encourage new entrepreneurs in taking up indigenous manufacture of imported spare parts.

Annexure 24-A

PLAN PROGRESS AT A GLANCE

	1950-51	End of 1st 5-year plan	End of 2nd 5-year plan	End of 3rd 5-year plan	End of 4th 5-year plan	End of 5th 5-year plan	As on 31.3.85
1	2	3	4	5	6	7	8
I. General							
(a) Capital-at-Charge (Rs. in crores)	827.0	969.0	1520.9	2680.3	3,893.4	4,797.1	8,285,65
(b) Route Kilometres	53,596	55,011	56,247	58,399	60.234	60,693	61,850
(c) Electrified Route Kms.	388	388	748	2,423	4,191	4,720	6,325
(d) Number of stations	5,976	6,152	6,523	6,986	7,079	7,020	7,093
(e) Number of staff (in thousands)	914	1,025	1.157	1,352	1,432	1,495	1,603
II. Rolling Stock							
(a) No. of Locomotives :							
(i) Steam	8,120	9,026	10,312	10,613	8,847	8,215	5,970
(ii) Diesel	17	67	181	727	1,610	2,025	2,905
(iii) Electric	72	79	131	403	669	901	1,253
(b) No. of passenger vehicles	13,109	15,984	20,178	22,804	26,108	26,647	27,805

1	2	3	4	5	6	7	8
(c) Electric Multiple Unit Coaches	460	574	846	1,355	1,892	2,321	2,957
(d) Other coaching Vehicles	6,059	6,730	7,415	8,763	8,422	8,260	7,789
(e) No. of wagons	205,596	240,756	307,707	370,017	388,366	379,771	365,390
III. Volume of Traffic							
(a) Tonnage originating-Revenue (in millions)	73.2	92.2	119.8	162.0	162.1	210.8	236.43
Total including non-Revenue traffic (in millions)	93.0	115.9	156.2	203.0	184.9	237.3	264.76
(b) Net Tonne Kilometres-Revenue (in millions)	37,565	50,435	72,333	98,978	109,391	150,250	172,632
Total including non-Revenue traffic (in millions)	44,117	59,576	87,680	116,936	122,354	1,62,687	182,161
(c) Passengers originating (in millions)							
(i) Suburban	412	495	680	1,018	1,437	1,928	1,884
(ii) Non-suburban	872	780	914	1,064	1,217	1,575	1,449
Total	1,284	1,275	1.594	2,082	2,654	3,503	3,333

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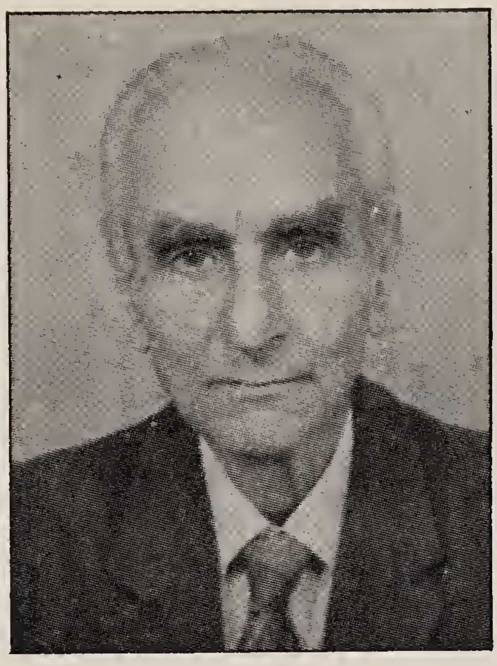

Shri G.S. Khosla has worked for 35 years on the Indian Railways during which he gained varied and extensive experience of Railway operations and management. Starting his career as an Asstt. Transportation Officer in 1937, he held various senior posts including that of General Manager, Western Railway. He was a Director of the National Coal Development Corporation and a Trustee of the Bombay Port Trust for three years.

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